Urban Development and the Socio-Spatial Transformation of Retail Areas:

A Case Study of Provincial Towns in Thailand

by

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TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

LIST OF ILLUSTRATIONS

CHAPTER 1

CHAPTER 2

CHAPTER 3

CHAPTER 4

CHAPTER 5

LIST OF ILLUSTRATIONS (continued)

CHAPTER 6

CHAPTER 7

CHAPTER 8

LIST OF ILLUSTRATIONS (continued)

APPENDIX A

APPENDIX D

APPENDIX G

APPENDIX H

APPENDIX I

LIST OF ILLUSTRATIONS (continued)

LIST OF TABLES

CHAPTER 3

CHAPTER 5

CHAPTER 6

CHAPTER 7

LIST OF TABLES (continued)

CHAPTER 8

CHAPTER 9

APPENDIX D

APPENDIX E

LIST OF TABLES (continued)

APPENDIX F

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Unfortunately, I had found errors in all the data processing results. For this event, I asked for and got further technical supports from the software development team at Space Syntax-University College London and the Space Syntax community at SPACESYNTAX@jiscmail. A special mention was for Shinichi Iida at Bartlett for his very kind helps. Finally I shifted to the new software and restarted the entire data processing stage.

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DECLARATION

This thesis is the author's original work. Except for some parts of the data collection, such as traffic movement and socio-economic interaction in public space, which required fieldwork assistants, the author had confidence in overall accuracy of the primary data gathered at the sites. Due to limitation of secondary data accessibility of the studied sites, the research therefore needed to collect the necessary primary data such as the physical built environment observation and map updating. In addition, the research methodology required two data sets to be recorded at multiple spots at the same time, on weekdays and weekends and within one hour at each observation period. Consequently, five assistants were trained and tested once before the actual fieldwork observation. However, the author alone was responsible for the processing and analysis of the recorded data.

The author also confirms that the thesis has not been submitted for a degree at another university.

ABSTRACT

Urban Development and the Socio-Spatial Transformation of Retail Areas: A Case Study of Provincial Towns in Thailand

This research aims to address the impact of globalisation on urban development process in the context of global South, through the case study of the socio-spatial dimensions of retail areas in three provincial Thai towns over the last 50 years. Contemporary issues of urban growth linked to globalisation have been studied in various disciplines but mostly in relation to large cities. They have been less concerned with the local scale and particularly in the transitional/new urban areas of developing countries with loose planning policies and regulations. The methodology and research design uses two different theoretical frameworks, primarily spatial configuration, and secondarily spatial political economy and the relations between them. The analysis focuses on three main types of data: spatial configuration by applying space syntax techniques; secondary data including maps of urban development over a 50-year time period; and fieldwork observations of physical retail area development and retail behaviour of users through systematic recording and analysis of a questionnaire survey.

There are four research questions. The first two focus on the physical and spatial transformation of retail areas in two aspects: the centrality of the town centre (Chapter 5) and urban expansion on the fringe of town (Chapter 6). The last two questions address the relationships between the changing physical and spatial configuration and the political economy, through a particular emphasis on the retail area development (Chapter 7) and retail patterns (Chapter 8).

According to the primary framework of the research, the analysis reveals that the spatial structure of towns has been dominated by the road networks and that urban land use has changed over time, which has altered the spatial properties leading to development, decline and redevelopment, as well as spatial segregation in varying degrees, in some areas of the towns. From the secondary framework, the political economic contexts of the sites were identified as significant in terms of generating production and (re)production of urban spaces through the planning policies and practices, which has been mainly through a top-down and static approach to development although there is evidence of some tensions between the local and global political economy.

The research contributes to the extension of understanding of the globalisation impact on retail urban development in the global South. The analysis of socio-spatial processes of urban development can be emphasised using the multi-disciplinary approach and framework, as shown in the three provincial case study towns in Thailand. The empirical research findings reveal that globalisation in the global South is not static and uniform but dynamic and complex process, for example, the land use conflict between local and multinational retailers at local level. Notably, this research emphasises the importance of local context consideration in terms of informality, traditionalism, localism which influence the characteristics of place, including patterns of socio-spatial relations within urban retail development.

ABBREVIATIONS

ANG	Ang Thong
CBD	Central Business District
CHA	Chachoengsao
CPB	Crown Property Bureau
Rn	Global Integration
Int	Intelligibility
Km	Kilometre
Rlocal/R2, 3, …	Local Integration
MD	Mean depth
NAK	Nakhon Nayok
OSR	Open Space Ratio
Km^2	Square kilometre
Syn	Synergy

GLOSSARY

Axial line	one-dimensional element in the basic spatial configuration analysis, representing permeability or accessibility.
Axial map	the coloured map generated by Depthmap software, in order to illustrate the probabilistic field of potential encounter and avoidance (Hillier et al., 1993, p. 4)
Compactness	the indicator to assess density related to public space usage in this research
Connectivity	the number of lines that directly intersect the given axial line (Jiang and Claramunt, 2002, p. 298)
Depth	the number of lines distant from a given number of steps to that axial line (Jiang and Claramunt, 2002, p. 298)
Global Integration	considers both immediate and non-immediate neighbourhoods up to k (all) steps away (Jiang and Claramunt, 2002, p. 299)
Integration value	linear depth from all other lines in the system (Hillier, 1996a, p.119) or the level of accessibility in this research
Intelligibility	the measurement of the part–whole relationship within the spatial configuration, calculated from the coefficient of correlation between local and Global Integrations, in which "a local area is said to be intelligible if its coefficient value is higher than the one of global area" (Jiang and Claramunt, 2002, p. 298)
Local Integration	Depending on the depth used, Local Integration considers both immediate and non-immediate neighbourhoods "that is, lines that intersect each immediate neighbourhood and so on recursively up to a few steps away" (ibid)
Modern trade	refers to type of trading adopted modern technologies such as barcodes and internet for store management, including up-to-date services-responding to customer needs and modern lifestyles, particularly chain stores and modern supermarkets
Para-transit	public transport modes typically run by private operators which are flexible, affordable, door to door service, in developing country context
Popular market or	a typical pattern of main retail areas in Thailand, in which the

regular market *(Talaad Samai Niyom)*	main retail area is surrounded by shophouses, mostly expanded from the first-period retail area, and situated near the first central bus station
Retail patterns	considered of three different elements: 1) retailing patterns, 2) movement patterns and 3) interactions in the main public spaces of the retail areas
Self-contained urban project	The built environment and building that constituting a complete and independent unit in and of itself such as shopping centre, entertainment complex and the large-sized public or private institutions
Shophouse	both residential and commercial unit of the trader, used in the context of Southeast Asia
Spatial segregation	in this research includes both physical and social segregation
Subsistence agriculture	or self-sufficiency farming in which the farmers focus on growing enough food to feed themselves and their families
Synergy	the coefficient of correlation between Connectivity and Global Integration, used to describe the connectivity–whole relationship within the spatial configuration
Temporary market, farmers' market, or *'Talaad Nad'*	a pattern of market place in Thailand, arranged by vending stalls gathered in open space with wide range of goods
Traditional or local trade	typically formed by the mixtures of traditional market system and local individual retailers such as small retailers in the form of shophouses in Southeast Asia
Wet market or *'Talaad Sod'* (open market or daily market)	a market place providing rental units selling fresh produces

CHAPTER 1

INTRODUCTION

This thesis focuses on the socio-spatial development processes of contemporary towns in developing countries of Southeast Asia since the 1960s through original empirical research undertaken in Thailand (the home country of the researcher). The conceptual framework has been developed primarily from ideas of spatial configuration in architecture and urban design (the discipline and training of the researcher), and secondarily from approaches within spatial political economy. The socio-spatial processes were empirically observed and analysed by applying space syntax software and its method in medium-sized provincial towns in Thailand which exemplify a lack of regulated urban planning. The research aims to contribute to the understanding of the local impact of globalisation on socio-spatial changes in contemporary urban development processes, in the context of global South.

This chapter begins with a section on the importance of the research, sets out the research questions and presents problematic issues in architectural and urban design research and practice. Secondly, the section on Issues in Contemporary Urban Development introduces the audience to the rapid and uncontrolled urban expansion in developing countries, which is the identified problem of the research. Then, the section on the Socio-Economic Transition of Thai Towns undergoing Urbanisation, provides the economic background at the local and regional levels, and how there are changes through modern development and relating to transportation, urban settlement and retail development. The last section set out the thesis structure of nine chapters.

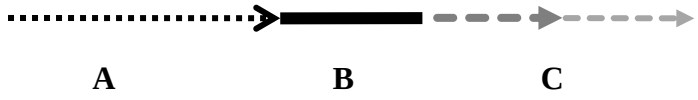
IMPORTANCE OF THE RESEARCH

This thesis on provincial Thai towns has been undertaken within the field of architecture and urban design from the standpoint of a multi-disciplinary approach using rigorous methodology, to deal with the complex and dynamic issues of urban change. This study brings together spatial configuration as the main approach and spatial political economy as secondary in contemporary urban studies, in order to address the impact of globalisation on retail development Thai provincial towns.

Thai provincial towns are considered in this thesis to be representative of urban transitional areas in developing countries where inequality has been the issue in urban development. Changes in town centrality in relation to retail patterns will be studied in particular because they are sites of are intensive socio-economic activities which reveal the complexities and tensions between the local and the global in terms of the varied impacts of globalisation. The findings chapters explore both changes over time in terms of town centrality and retail developments in Chapter 5 to 7, and also changes in retail behaviour in Chapter 8.

Thailand is the focus of this research, but the findings of this case study will be generalisable to some extent to other South East Asian countries and the selected towns are representative of medium size towns without specific historic sites in Thailand. This thesis is an analysis of the urban development process focusing on the transformation of retail areas over the last 50 years in Thai provincial towns as a way of extending understandings of the varied and complex impacts of globalisation in medium size towns.

Figure 1.1 Time line of urban development process in relation to research questions



A: Contemporary urban development (1960s to 2009 for this research)

B: Recent (2009-2013 for this research)

C: Future trend (2010 onwards for this research)

Research questions:

The research study has four research questions:

1. How has the socio-spatial structure of retail area development in Thai provincial towns changed over the last 50 years? (A-B, see Figure 1.1)

2. What are the characteristics of urban expansion in relation to retail area development in provincial towns, and does it show any features of spatial segregation in the different contexts? (B)

3. How have new retail developments affected the spatial properties of the main retail areas and led to the decline of older retail areas? (A-C)

4. How have differences in the spatial and physical characteristics of retail area developments influenced the retail behaviour patterns of users? (B)

ISSUES IN ARCHITECTURE AND URBAN DESIGN RESEARCH

Urban space and its development have been commonly viewed by many scholars from different disciplinary backgrounds as complex, dynamic and diverse in terms of interpretation, conceptual frameworks and approach (Scargill, 1979; Bourne, 1982; Lennard and Lennard, 1995; Jenks et al., 2008). This is explored in more detail in the thesis Chapter 2 in the section on ISSUES IN ARCHITECTURE AND URBAN DESIGN RESEARCH. Moreover, contemporary urban development linked to globalisation has become an important challenging issue due to its multiple social dimensions (Giddens, 1990) particularly in the context of global South (Roy, 2005; Watson, 2008; Parnell and Robinson, 2012). This is explored further in the section on GLOBALISATION AND URBAN DEVELOPMENT in Chapter 2. Rapid and uncontrolled urban expansion such as urban sprawl, fragmentation, decline and suburbanisation seems to worsen or complicate existing problems in transitional areas. In this sense, the process of urban transformation underlying globalisation in the context of global South has become the starting point of this research.

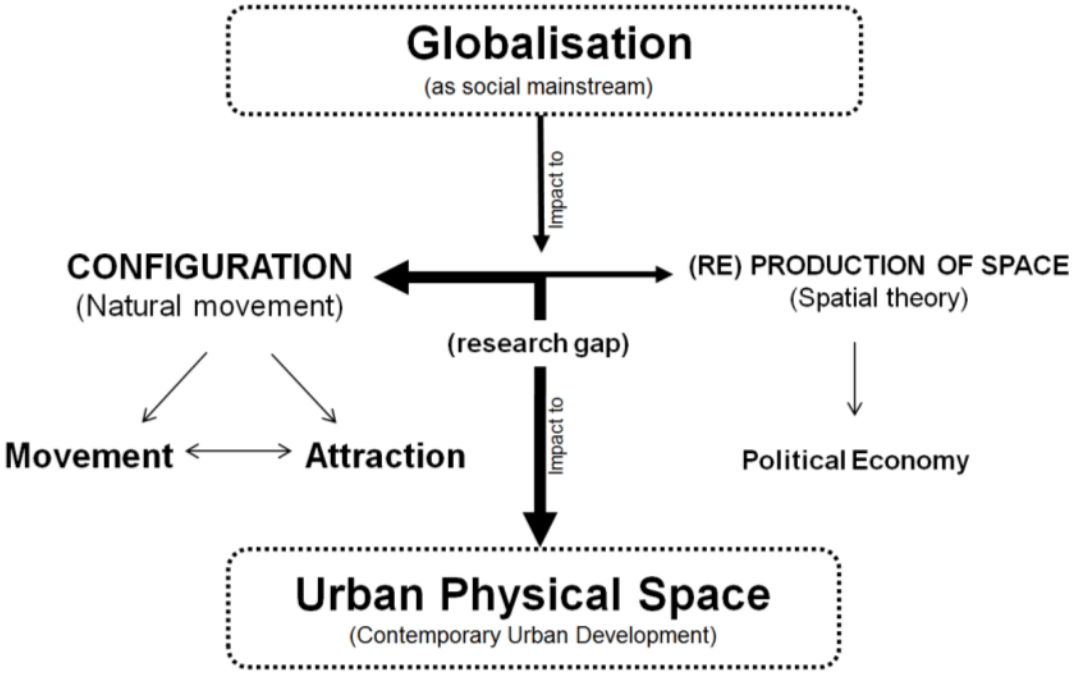
Architects, urban designers and planners are often seen as directly responsible for urban development. Within the fields of planning and urban studies researchers have debated which factors shape urban form, as well as which methods would be best for the analysis of the complex development process in the context of contemporary cities. It is clear that the method of exploring the physical built environment is closely linked to urban form, function and aesthetics and is well-established within architecture and urban design. However, failures in architecture, urban design and planning have occurred, such as designs that have resulted in isolation and segregation in urban spaces, or those without reasonable function or usage. These failures have been heavily

criticised from both inside and outside the field of urban design and planning, especially from social scientists on the grounds that social and human dimensions have been overlooked (Jacobs, 1961; Marquez, 2011; Lefebvre, 1991; Harvey, 2003).

These critiques have challenged architects, designers and planners to explore new methods or multidisciplinary approaches. Social geographers and social philosophers argue that the (urban) space we are living in is the result of the (re)production of capital involved with social dimensions and underlying political power (Lefebvre, 1991; Lefebvre and Nicholson-Smith, 1991). The process of (re)production creates uneven development in urban landscapes and policies which bring about disagreement, conflict and fragmentation in society. In this sense, architecture, urban design and planning are often criticised as being agents used by the state for the social control of its citizens, implying it can be a tool of class division (Harvey, 2003). This topic is discussed in more detail in the Chapter in the section on the SPATIAL POLITICAL ECONOMY APPROACH.

A spatial configuration approach based on space syntax theory is set out in more detail in Chapter 2 in the section on SPATIAL CONFIGURATION OF URBAN DEVELOPMENT which aims to provide social understanding of spaces in a more rational and precise way than the existing methods in architectural and urban design, through applying cross-disciplinary methods. Natural movement theory has argued that the complex social relations embedded in urban space stem from the spatial configuration (of urban structure) itself (Hillier and Hanson, 1984; Hillier, 1996b; 1999b).

Figure 1.2 Conceptual framework



The diagram shows how globalisation (as social mainstream) impacts on the process of contemporary urban development. The thesis approaches the issue emphasising primarily spatial configuration and secondarily the spatial political economy. By adopting two main approaches together, the conceptual and theoretical framework (Figure 1.2) was developed for the analysis of rapid changes in retail area development in contemporary towns. Benefits of the integration of two different frameworks are not only to enforce/rigour in social and human dimensions, but studying spatial configuration by using space syntax also adds a scientific/mathematical aspect using systematic observation in architectural and urban design researches. Further explanation of conceptual framework is also found in the section on the SOCIO-SPATIAL CONCEPTS IN CONTEMPORARY URBAN DEVELOPMENT PROCESS in Chapter 2.

ISSUES IN CONTEMPORARY URBAN DEVELOPMENT

The rapid expansion of low-density urban areas that do not coordinate with existing settlements and public services is common in developing countries and has resulted into sprawling urban patterns. The extensions of roadside development including retail urban projects such as shopping centres are common scenes in many developing countries. As a result, many cities have a similar style of built environment, behavioural patterns and urban development policies despite being located in different parts of the world (Zukin, 1991; Taylor et al., 2007).

In contemporary urban studies of Southeast Asia, most research has been concerned with the regional or national development, whilst less research has been undertaken regarding the impact of globalisation on local retail economies that leads to fundamental changes of urban structure (Hackenberg, 1980). In most developing countries, where the regulatory systems are fragile, edge growth has often produced expanding suburbia, destroying agricultural areas and changing the way of life (Hudalah et al., 2007). Inadequacy of infrastructure and fragmented road networks are the features of dispersed urban settlement such as sprawl, fragmentation and spatial segregation leading to the decline of some areas while over-crowding others (Bruegmann, 2005; Winarso, 2002; Ingersoll, 2006).

Within the town centre and its vicinity, contemporary urban development has often resulted in urban decline and dispersed development. Contemporary towns have been facing the transition from a rural-agricultural to an urban-industrial economic base. Conflicts in urban land use may occur between competing interest groups. An example of this would be new transnational/ multinational retailers becoming established, despite local protests and conflicts leading to social segregation in some cases. On the other

hand, many densely populated areas, vibrant with socio-economic activities despite old and decaying conditions, are targeted for clearance rather than regeneration. This is explored in more detail in Chapter 2 in the sections on the CONTEMPORARY URBAN DEVELOPMENT: CHALLENGES AND OPPORTUNITIES and GLOBALISATION AND URBAN DEVELOPMENT.

The urban areas situated between planned and unplanned (or natural growth and designed environment) areas, being neither small nor large, are of interest. Provincial towns are one of these transitional areas in developing countries and retail developments in them are the foci of this thesis as they provide sites for the exploration of the complex spatial and social dimensions of urban retail development as influenced by globalising trade in the global south. There has been recent literature on how the process of globalisation differs in the global North and South (e.g. Roy, 2005; Watson, 2008; Parnell and Robinson, 2012) and the literature is reviewed in Chapter 2 in the section on the Global concepts to local realities, and the interfacing of local and global aspects of retail development are explored in Chapters 8 and 9 in the section on the ORIGINAL CONTRIBUTION TO KNOWLEDGE.

SOCIO-ECONOMIC TRANSITION OF THAI TOWNS UNDERGOING URBANISATION

Economic Structure Transition

Similar to most Asian countries in the past, Thailand was once governed by an absolute monarchy and feudal social system, which shaped the town and country planning of the region. The domestic economy was run by a closed-system with a highly centralised policy, in which a limited number of products could be exchanged among towns and

regional kingdoms (Apawatcharut Charoenmuang, 1999). Two events in particular significantly opened the country and linked Thailand to the world trade system. The first was the 1855 Foreign Trade Contract with the UK (Bowring Treaty) and the second was the 1932 transformation into a democratic form of government with the King as Head of State. The Thai economy in relation to the trade gradually developed, however the main income was still dominated by agriculture for domestic consumption rather than exports (Rigg, 2003).

The first Thai national economic and social development plan in 1961 encouraged by the World Bank, aimed to drive the country forward by using a Western model and benchmarking with 'civilised nations'. This meant increasing incrementally the pace of national development from agriculture to manufacturing and services (International Development Centre of Japan, 1992; Apawatcharut Charoenmuang, 1999). The policy of economic production was therefore weighted towards export-led growth and promoted the manufacturing sector (Charoenloet, 1995; Office of the National Economic and Social Development Board, 1961; Dilokwanich, 1995; Baker and Phongpaichit, 2005). The report of the Economic Outlook for Thailand 1993-1995 revealed the rapid rate of expansion of the manufacturing sector, compared with the agricultural sector. Before the 1960s, agriculture was the main economic activity of Thailand, generating almost 80% of GDP, but by 2008, it was reduced to 11.64% of GDP (Statistical Forecasting Bureau, 2008). In 2009, the industrial and agro-industrial gross product generated 64.24% of total export revenue, while the agricultural gross product was at 10.59% (Customs Department, 2009). In the past, the provincial and national economy was largely dependent on agriculture, strongly relying on close-knit social relations and proximity. Capitalism, nonetheless, induced changes and slowly

replaced a barter economy with an exchange economy using money (Thanaphornphan, 1995). Expansion of the industrial sector replaced some of the farmland with factories. Emerging industrial estates brought labour and public services to areas, as well as the rapid emergence of trade and services such as shops and rental apartments. The country developed a higher urbanisation rate in terms of both expansion and density, in which the industrial towns played an important role in relation to the GDP and other economic activities of provinces. In particular, the real estate, trade and service sectors were responsively developed to support the expansion of the industrial sector.

The transformation of real estate investment in Thailand had great typological diversity and intensive competition in the property market in big cities, such as Bangkok and its periphery or regional major cities such as Chiang Mai and Phuket. Big companies, with either Thai or foreign shareholders or both, generally invested in the industrial, housing property, trade and services projects. However, the infrastructure and public services have been invested in by the state or shared public-private sector.

From Rural-Agricultural to Urban-Industrial Economic and Modern Services Base Development

Since the first national economic and social development plan in 1961 the overall urban population in municipal areas has increased fourfold from 1966 to 2005 (National Statistical Office, 1970; 2006). Early on industrial development spread in the urban area of major cities in Thailand because of adequate utilities and facilities provided by the central government. This greatly affected the migration of labour from rural to urban areas. In 1960 the urban population was 5,372,895 in total and by 2011 reached 23,713,060 (Index Mundi, 2011). Thailand and most developing countries had been facing accumulated problems resulting from industrial development, in relation to

rapidly increasing population and emerging urbanisation (Thawinphipatkul, 1996; Hawley, 1971), which brought about environmental and social problems including urban inequality. The national economic structure once based on subsistence agriculture had been transformed into industrial productivity and consumption. Labour migration was not only a problem derived from underemployment (i.e. a mismatch of skills and jobs) but also the abandonment of domicile, family and tradition, with the rapid labour migration from rural areas.

Recently, multinational corporations expanding in the developing countries have undertaken the 'Westernisation of education' with the establishment of international schools and foreign-branch colleges in Thailand in locations relatively close to Bangkok and other large cities. Service sector business investments increasingly gained in overall economic significance at both provincial and national levels, namely in tourism and retailing. The importance of the tourism sector in particular has been highly regarded since the first national economic development plan (Apawatcharut Charoenmuang, 1999). The sector has continued its role in terms of revenue generation and has increased Thailand's presence in the global tourism industry. For example, in 2007 the country took the leading position in relation to numbers of international tourists amongst Southeast Asian countries. These sorts of businesses possess large plots of land, which usually include farmland and forest, and are organised in large self-contained urban projects. Both shifting from a rural-agricultural to an urban-industrial economic base and modern services can bring about dramatic changes in urban land use and can lead to uneven geography.

From Water Transports to Road Dependency

Like many other agricultural-based settlements in Southeast Asia, towns and cities in the central region of Thailand are characterised by river basins and tributaries wherein many market places were founded and still function on the river banks, such as in Bangkok, Yangon, Vientiane and Phnom Penh. In Thai literature, the importance of riverside village and the water-associated way of life as the origin of Thai towns is well established (Apawatcharut Charoenmuang, 1999; Chumsai Na Ayutthaya, 1986). Many significant town centres began on the riverside particularly in the central region of Thailand, where waterway transport and logistics had dominated the socio-economic well-being of the nation for a long time (Whyte, 1976) before eventually declining in later years.

In the context of Southeast Asia, the development of road networks became increasingly important and, most recently, the major mode of transportation (Colombijn, 2002). Some studies have shown that the most significant factor to alter the Thai way of life and transform it into a ‘mass society’ is the development of transportation through road network improvement, motorcycles and tour buses (Baker and Phongpaichit, 2005). This began after WWII when the US, then fighting communism in the region, encouraged the Thai government to improve the road network throughout the country for military purposes. During the period of the third national economic and social development plan in 1972 the central government policy was beginning to concentrate on the facilitation of public services and improving infrastructure in remote areas (excluding the capital and secondary cities). Consequently, during the 1980s roads and buses inevitably became very important while private cars were still unaffordable for many citizens.

In the following years the Japanese motorcycle and car companies started manufacturing in Thailand, whilst the consumption of second-hand cars was also promoted. This resulted in the motorcycle becoming owned by most families in the 1990s. Nowadays the country has become one of the biggest Japanese car and motorcycle manufacturing hubs in Asia and a recent Thai government campaign also introduced a tax incentive for first time car buyers. The amount of registered vehicles in 2011 had increased over fourfold since 1988 (Transport Statistics Sub-Division, 1988; 2011).

Local Economic Structure: Retail Development of Provincial Town

The topic of this thesis is socio-spatial changes in retail developments and behaviour in Thai provincial towns as a way of extending understandings of the complexities of the impact of globalisation at the local level. In Thailand, a town centre is a hub for the exchange of goods and services and is composed of various types of land use (Potter and Lloyd-Evans, 1998), including mixed residential-commercial dwellings that combine home and shop together (i.e. shophouses, see Figure 1.3-A and B), government offices and other utilities or public services. Markets (*Talaad*) have different styles, for example, the temporary market (*Talaad Nad,* see Figure 1.3-F), also known in some countries as the farmers' market, is arranged with vending stalls gathered in open space and regularly organised on particular days and times of the week. A wide range of goods, from fresh vegetables and meats to other grocery products and ready-made meals, as well as kitchenware and hardware products, clothes, plants and even pet animals, can be found in a temporary market.

Figure 1.3 Retail developments in provincial town

A: Old-style shophouses, CHA

B: Modern-style shophouses, ANG

C: Wet market building in the 2nd period retail area and temporary vendors surrounding wet market, NAK

D: The modern retail area, CHA

E: Modern convenient store in town centre, CHA

F: Temporary market, NAK

Another type is located in a permanent market building, where the ground floor space is normally shared by rental units of fixed stalls that open daily. The largest section of these rental units selling fresh produces is called a wet market, open market or daily market (*Talaad Sod*, see Figure 1.3-C) operating twice a day from 03:30 am to 09:00

am and evening hours from 03:00 pm to 06:00 pm approximately. These wet markets are usually in permanent buildings surrounded by semi-permanent and temporary vending stalls, which are located close to the main entrance. In the typical market or retail areas of Thailand, shophouses usually enclose, either or both, indoor and outdoor retail space, acting as boundaries of the main shopping venue. These residential-commercial buildings are separate units but they sometimes join up their extended frontage areas, functioning as semi-public space or, sometimes, for private usage. The extended frontage structures usually have shades or roofs made of fabric or sheet metal. These shophouse buildings are normally found to be at least two-storey high, for residential use upstairs and commercial use downstairs, and are a regional type of commercial building in East and Southeast Asia (Mui et al., 2003). The main retail area as described above is at the heart of a provincial town centre, surrounded by economic and social activities nearly 24 hours a day.

Most provincial towns, with reference to the case study towns in this research, still lack diversity in terms of investment. A concern is the impact of modern trade on the structure of the local economy. Currently modern trade in Thailand is, by and large, from Western transnational or multinational businesses such as Tesco, Carrefour and Macro that increasingly affect the neighbourhood shops and other kinds of small scale economy (Suebsukcharoen, 2002); where the traditional retail markets are forced to compete with the scale adjusted retailing of modern trade, which ranges from out-of-town to neighbourhood locations. These new retailing companies use various effective marketing strategies which include the resizing and category-adjustment of retail stores for specific locations (Sabphaithoon, 2001). An example is the Tesco retail network that includes Tesco-Lotus Express (a small-sized supermarket and convenient store), Tesco

Talaad (medium-sized Tesco local market) Tesco-Lotus Khumkha (local discount store), Tesco-Lotus (hypermarket) and Plus Mall (shopping mall) (Ek Chai Distribution Co., 2010). These varying scales of retailing outlet greatly affect a decrease in the number of local retailers and local-scale economy in general. Recently the Retail Trade Report of Thailand (Thailand Development Research Institute, 2000; Economic Reporter Thairath, 2012) assessed the tendency of future monopolisation in retailing business by the multinational companies. The impact of a proposed Tesco –Lotus retail development in the case study towns is explored in Chapter 7 and 8.

Global economy in the form of modern trade is not only having an effect on the economic structure at various levels, as previously mentioned, but is also bringing about changes in the urban and built environment (Wu and Plantinga, 2003; Hudalah et al., 2007). Modern department stores, including entertainment centres, are popular and have replaced the traditional trades. Earlier retail outlets and markets were usually small shops or family-run businesses, whilst modern trade retail such as discount stores and department stores require vast land plots with easy access. With limitations on the availability and high rent of land in town centres, modern businesses therefore mostly locate close to the main roads in suburban areas which are often green or agricultural zones. Transportation facility development such as new road construction clearly confirms that the typical idea of economic growth model is endorsed by government policy. This has continued despite being revealed in several studies (van Nes, 2003; Azimzadeh, 2003; Colombijn, 2002) that road construction has direct impact on both local life and ecology.

This background to the socio-economy of Thailand has set out the rapid process of industrialisation that has affected the population and the towns and cities of the country.

The focus on the thesis on retail development and behaviour in provincial Thai towns allows a nuanced exploration of the local impacts of globalisation socio-spatially in order to extend understandings of globalisation in the global South.

THESIS STRUCTURE

This thesis has nine chapters, Chapter 1 is the Introduction and also provides the socio-economic and historical background of this research. Chapter 2 comprises a critical review of relevant literature. Chapter 3 is the research methodology and methods which explains the design of research and sets out the set of indicators for this research. Chapter 4 provides the setting of the case study sites including the political, economic and urban development background of provincial towns in Thailand.

There are four findings chapters related to the four research questions. Chapter 5 is an analysis of changes in retail area development and town centrality over the last 50 years; Chapter 6 is an analysis of spatial segregation and the characteristics of urban expansion in provincial towns particularly on the emergence of new retail development areas; Chapter 7 is an analysis of the process of retail area development and redevelopment and the links between global retail trade and local resistance to it. Chapter 8 is an analysis of the spatial behavioural patterns of retail areas in provincial towns. Chapter 9 sets out the conclusions which address the impacts of globalisation on urban development processes in the context of global South.

The next chapter (Chapter 2) is a review of the key literature in order to identify the conceptual framework of the thesis. The chapter begins with the urban development and urban structure in different approaches, in architecture and urban design researches. It is followed with the topic of globalisation in relation to urban changes in different context,

e.g. global North and South. Then, the two groups of key literature of this research – spatial configuration and political economy, are debated at the end in order to set up the conceptual framework, including gaps in research, aims and the research questions.

CHAPTER 2

SOCIO-SPATIAL ISSUES

OF CONTEMPORARY URBAN DEVELOPMENT

This chapter presents the conceptual framework for exploring how urban development and changes in urban spatial structure are influenced by certain aspects of globalisation and critically reviews the literature. The chapter begins with contemporary issues in urban development to acknowledge urban growth and issues of decline and urban expansion. The second section, on urban development and urban structure, explores the critiques of the limitations of urban development and research based on different approaches to architecture and urban design and planning. The third section focuses on globalisation and urban development, which aims to define urban space in relation to its social dimensions. This section addressed the impact of globalisation to urban development processes in the context of global South which is a significant part of conceptual framework of this research. The fourth section explores spatial configuration in contemporary urban studies. The last section concludes with the conceptual framework and identification of the gaps in research, aims and the research questions to be addressed in this research.

CONTEMPORARY URBAN DEVELOPMENT: CHALLENGES AND OPPORTUNITIES

Importance and Development of Town Centres

The study of town centres is well established in architecture and urban design particularly in investigating the spatial and social forms of settlements. Considering the

physical aspect, the central area of a city is often geographically located in the middle and usually referred to as the central business district (CBD) (or core, nucleus or centrality of a town). This area is characterised by a high concentration of commerce and associated high land values. From an economic aspect, investors, property owners and shoppers see town centres primarily as places of investment, profit and consumption respectively (Evans, 1997). Furthermore, this agglomeration of shops is recognised as a centre of integration of social, economic activities and cultural life of the town (Bromley, 1997).

A 'successful' town centre is seen as one that not only considers economic prosperity but also social relations; that bind people in the society together. The concept of a 'live centre' refers to both physical and socio-spatial qualities of the built environment. Phenomenologists have pointed out the importance of streets including pedestrian activity as the 'heart of the city' (Jacobs, 1961) and a 'lively street life' (Seamon, 1994). In these definitions, a prosperous town centre is characterised by a large number of diverse pedestrians, various land uses and building types, as well as multiple socio-economic activities and interactions. In this context, changes in customer behaviour linked to retail patterns can have a significant impact on the vibrancy or decline of activities in town centres and could have a cascading effect in enhancing or destroying them (Clark, 1989; Gayler, 1984; Evans, 1997).

Shopping Patterns

Shopping is a mixture of economic, social and leisure activities, which includes consumption as an individual experience linked to the built-environment (Williams, 2003). The study of consumer behaviour linked to town shopping centres is an established subject in urban studies. Recent research has moved away from the classic

Central Place Theory (Christaller and Baskin, 1966) which focused on real distance and location of relationships. Current economic structure, including lifestyle, is now seen to be influenced by a globalised social mainstream which transforms our sense of distance. Road network and transport improvement, as well as car ownership, have reduced limitations previously caused by distance and location of the destination. Consumption is also influenced by demographics and individual perceptions of a centre's size and distance (O'Neill and Jasper, 1992). The distance between home and shopping areas does not impact on shopping destination choices, particularly where customers own a car (van Leeuwena and Rietvelda, 2011). High income and high social class groups tend to stay out of town in gated community housing and these groups also travel a longer distance from their place of residence to shopping areas than lower income groups and therefore become a target group of customers for out-of-town modern shopping centres (Gayler, 1980).

There are a number of differences between retail patterns in developed and developing regions in terms of economic structure and its connection to social relations (Bromley, 1997). Traditional or local trade in developing countries was typically formed by a mix of traditional markets and local individual retailers. Small retailers in the form of shophouses, vendors and informal street markets are common retail patterns in some Asian and most Southeast Asian countries (Dick and Rimmer, 1998; Mui et al., 2003).

Decline and Revitalisation of Town Centre Retail Areas

The decline of a town centre is a transformation stage that can be observed through economic and physical aspects, such as the condition of buildings and structures, closure of shops and the changes in building use purposes. The reasons for decline are commonly linked to emerging modern trade centres, or nearby new subcentres. In the

UK, the decline of town centres has been seen as an inevitable result of decentralisation policy, personal mobility/car use, increased competition from the out-of-town commercial areas, and modern day lifestyle and consumption patterns (Balchin et al., 1995; Evans, 1997).

Modern trade and planning policy also impacts on local retail business. Changes in consumer behaviour in Asia, evidenced by the decline of small family-run shops and traditional trades, particularly in urban centres, has been found to be the result of competition between small businesses and transnational retailing through unregulated planning policy and a gap in regulation (Schütte and Ciarlante, 1998). In Malaysia, for example, retailing trends have clearly changed from individual small-scale to large-scale retail (Mui et al., 2003). In the Dongdaemun market in Korea, the rise of modern trade such as chain stores and modern supermarkets, which were linked to Korean industrialisation, influenced the decline of traditional markets in the old city centre (Kim et al., 2004). These studies suggest that urban revitalisation policy should include the existing community as well as the overall physical development (or regeneration) of the area. Participation in planning has been gaining importance and has been applied in different areas. The study of the reformed planning system in England (Brownill and Carpenter, 2007) points out that the continuity of participation as initiated by the local community is more successful than those determined by government policies. In contrast, participation processes and urban development policies of developing countries are often directed by central governments regardless of the local context thus bringing about the side effects. For example, in Quito, Ecuador the changes of town centre structure, retail activities and associated road construction led to linear retail

development along the roadside, as characterised by a sparse periphery, which affected the vitality of existing market-place trading (Bromley, 1998).

Urban Expansion and Retail Developments at the Fringe of Towns

Rapid and unregulated urban expansion has generated a number of initially unrelated and unconnected new settlements to existing town structures. This is the new urban phenomena of physical-spatial changes, which can be found in many big cities (Jenks et al., 2008). Present-day cities are expanding with rising populations and loosely regulated segregated and dispersed new developments. The rapidly increasing needs of these areas leads to an imbalance and challenges to physical coherence characterised by scattered urban expansion and sprawling growth along major roads (Lynch, 1981). The emergence of commercial strips, informal settlements and traders alongside roads leads to challenges in both the physical environment and urban management, such as car-based transport and the urban expansion into green areas. In addition, new sections of road are often disconnected from broader transportation network systems, which shift the urban structure from singular into multiple commercial centres. In general, cities in these contexts shift from small into large-size, and single into multiple centres (Jenks et al., 2008).

Shared physical features of contemporary cities are urban expansion and sprawl (Bruegmann, 2005; Ewing et al., 2002), fragmentation (Kozak, 2008), segregation (Vaughan, 2005), low density, low level of public accessibility and a lack of diversity in urban land use. The organisation of space is often disjointed and separation is often coupled with socio-economic and other divisions that lead to social segregation in terms of urban management and policy. Most studies in contemporary urban expansion concur

that these patterns of sprawl, fragmented and segregated development are unsustainable urban forms that result in further long-term problems.

Impact of Dispersal Expansion on the Urban Environment

Exploring dispersed expansion from a multi-disciplinary perspective reveals several disadvantages. Linear settlements have been found to be less effective urban development forms leading to energy waste, environmental pollution and costly road construction and maintenance (Trubka et al., 2010). There are environmental and social costs of dispersed or less structured public transport, focusing on road-oriented development as a result of inefficiency in terms of land consumption (Camagni et al., 2002). Urban form has also been found to have an impact on the quality of life, public health and well-being (Dora et al., 2011). Dispersed urban expansion with road-oriented transport dependency had been found to increase both mental and physical health problems, such as road traffic injuries, air pollution and lack of physical activity linked to obesity and non-communicable diseases.

From the viewpoints of architecture and urban design, the edgeless and segregated urban expansion, clearly diffused by new roads and highways, are the characteristics of modern cities (Jacobs, 1961). The linear settlement has been found to lack focal and intensive centres because the form is based on a continuous transport line (Lynch, 1981). Land alongside main roads or highways is quickly occupied because of the potential to attract stores and businesses due to their cheaper land value and high accessibility (by car). Consequently urban land use has changed, and the out-of-town green agricultural areas decrease and become mostly filled with residences, factories or large-sized modern shopping centres (Wu and Plantinga, 2003; Hudalah et al., 2007). Numerous studies reveal that dispersed urban expansion caused by increasing road

networks, stemmed from modern planning policy, impacts on the vitality of existing town centres particularly in historic towns (Medeiros et al., 2003; Al-Ghatam, 2003; van Nes, 2001).

Impacts of Globalisation/modernisation on Urban Development: Uneven Segregation and Conflicts

In theory, modernisation in urban development threatens social life and generates uneven development and conflicts in urban space (Smith, 2008; Harvey, 2006; Dennis, 2008). Apart from changing the physical environment, globalisation causes social, cultural and economic structural changes, generating complex relations in the existing urban area. On one hand, similar global trends of urban development, which is the shifting from a rural-agricultural to an urban-industrial economic base and more recently toward modern services, can show how important the growth of consumption really is (Schütte and Ciarlante, 1998; Bauman, 1998b). However, modernisation leads to the differences in income earning and widens the social and economic gap between business owners and labourers. This occurs even among developed countries which create new technologies. It is different in developing countries which provide labourers and resources (Barros and Sobreira, 2008; Charoenloet, 1995; Thanaphornphan, 1995; Cuenya, 2000); where the labour issues are particularly linked to many social problems.

An increasing number of middle-class city dwellers have desired private security, modern amenities and exclusive lifestyles (Hudalah et al., 2007). New patterns of urban land use, including self-contained urban projects such as a shopping centres, entertainment complexes, golf courses and gated communities have emerged in response to the mainstream globalisation of trade (Ingersoll, 2006; Mui et al., 2003), generating surveillance in urban space which leads to uneven development and social &

spatial segregation (Vaughan, 2005; Harvey, 2003; Sennett, 1990). Studies of modernisation in planning in Santiago, Chile, revealed that modern planning with controlled land use by zoning urban spaces caused significant territorial and social segregation in the city spaces (Marquez, 2011). Impact at a local level was also reported, such as the effects from a new road cutting directly through a community and how the road then dominated the patterns of social interaction in the community (Dora et al., 2011). Lennard and Lennard (1995) similarly have suggested that the development of the modern city causes destruction of neighbourhoods by highway construction and public spaces being converted into parking lots, which wastes valuable resources and creates pollution, safety and quality-of-life problems to the community's inhabitants.

Uneven urban development and social segregation as mentioned above, often leads to conflict and disagreement among dwellers of a town or city where there are competing interest groups. Where there are weak and insensitive planning regulations, social, economic and political conflicts in urban land use have been documented. The establishment of modern trade businesses, which are mostly transnational/ multinational retailers, have caused a number of protests and conflicts within communities and led to social segregation in some cases. On the other hand, many densely populated areas, with vibrant socio-economic activities despite being in a dilapidated condition, are often targeted for clearance rather than regeneration.

This section has reviewed literature covering contemporary urban development, focusing on the conditions for urban growth and the challenges of rapid urban expansion. Contemporary urban development has deeper and more complex dimensions than simply the physical structure of a city. Town centres gradually evolve and become

centres of social life. Globalisation as manifested by retail trading rapidly affects urban social and spatial changes. Road-oriented modern development connects each area together physically. However without regulation it spreads in every possible direction with limitless edges of cities or towns emerging. New development areas that emerge with limited consideration of the existing town are a common occurrence in developing countries. These patterns of urban development affect the quality of life and environment as well as urban management in the long term and may lead to uneven development, social segregation and social conflicts. Therefore planning needs to develop with a focus on social relations, developing a more contextual holistic socio-spatial understanding of the system that sustains the social life of towns in contemporary urban contexts.

URBAN DEVELOPMENT AND URBAN STRUCTURE

Urban development as a concept is complex and very broad, therefore it is easier to start with some fundamental questions such as how urban development links to urban structure and why the notion of urban structure is important for this research.

Many scholars from different disciplinary backgrounds define, in terms of urban studies, various approaches to urban development and attempt to interpret and explain the diversity and complexity of urban structure, as well as to consider the significant factors that affect urban growth. From the perspectives of architectural and urban design, it is clear that the well-established approach of exploring the physical dimensions of urban studies, which basically focuses on the built-environment quality of urban form, settlement and land use, includes the ideas of socio-spatial changes in the physical/urban structure of the cities (Knox and Pinch, 2006). This research focuses on

how retail urban structure has changed primarily socio-spatially with secondarily a consideration of how the changing spatial political economy affects and explains these socio-spatial changes. The literature on urban structure is relevant to the topic of this thesis.

Approaches in Urban Structure Studies

Four concepts will be focused on and these are urban structure as a system; urban structure as spatial arrangement; urban structure as a process; and the behavioural approach.

Some researchers view urban structure as a system (Cliff, 1975; Bourne, 1982; Emery and Trist, 1975) of complicated and self-organising interrelationships, influenced by specific social, economic, and political aspects. The spatial pattern or arrangement of these different elements thus generates the specific urban structure. The system theory approach divides urban spatial structure into three main components - form, flows, and organising mechanism (Emery and Trist, 1975). The term ‘urban structure’ is defined as a cooperation of an urban form, and its specific patterns of human behaviour and interaction (Bourne, 1982), operating based on a set of organisational rules. In contrast to the system approach, it has been proposed that urban structure is a spatial arrangement, the idea being that the city is not just a closed system but also an ongoing active system (Webber and Dyckman, 1964).

The third approach is the concept of urban structure as a process, which is driven by the external factors consisting of economic, political, and social factors (Scargill, 1979). Urban structure generally links to the following three processes: 1) the competitive economic land market, 2) the functioning of government and public institution and 3) the accepted patterns or norms of social behaviour. In addition to the above concepts,

Foley (1971) has suggested breaking down the urban structure into the two main parts of form and process. The former focuses on the anatomical study concerning static issues, whilst the latter is a functional and physiological study of continuous processes.

Taking a different perspective on the concepts of urban structure in architecture and urban design, behavioural issues become relevant as part of the urban development process. Social science research has revealed that behaviour has played an important role in urban development. Most researchers have agreed that human interpretation and perception is significantly delivered through interaction with the built environment (Jacobs, 1961; Lennard and Lennard, 1995). However, one problem is the way in which people often react/perceive the built environment as an individual issue. An early attempt to study human behaviour in relation to the built-environment was the seminal work by Lynch) 1960), in which the conclusion from studies of collective individual perceptions of the built environment suggested Path, Edge, Node, Landmark, and District as major elements of a city.

Definition of Urban Structure

In this study, the position taken is that urban structure is the ongoing and complex relations (Jenks et al., 2008; Foley, 1971) between physical development and social, political and economic influences (Jenks et al., 2008; Bourne, 1982; Scargill, 1979) affecting on its people (Jacobs, 1961; Lennard and Lennard, 1995; Lynch, 1960).

Considering the organisational aspect, which is of relevance to this research, various approaches have suggested separate consideration of urban structure in terms of ‘relations’, such as internal and external, aspatial and spatial relations (Foley, 1971). Firstly, the internal relations focus on the complex structure within a system—from the smallest element to the more complex level, whilst the focus on spatial and aspatial

relations looks at the changes influenced by external factors and uses a holistic approach. Foley also describes three aspects that influence the structure of a city, which are cultural, functional-organisational and physical. Each aspect relates to two levels of metropolitan structure: spatial (referring to a direct concern for the spatial pattern-physical environment) and aspatial (values, functional organisation of the community and another with cultural or value features of community life). However, both internal and aspatial aspects are conceptually subjective, and therefore one of the limitations of this approach is difficulties in interpretation and the operationalisation of the variables being measured. In this study, the use of spatial configuration analysis addresses this limitation.

Analysing and Measuring Urban Structure

In the field of urban physical development studies in architecture and urban design, the physical analysis and measurement of urban structure has various methods mostly focusing on physical observation, such as form, size, settlement, land use and building quality. The analysis of these basic physical elements is in fact related to the 'external relation' and the 'aspatial aspect' of urban structure. Most early analysis and presentation methods in the field of architecture and urban design used descriptive analysis incorporated with photographs, drawings, charts and diagrams.

Elements of urban structure analysis initially consisted of urban land use and the shape/form of urban settlements aiming to project the complexity of urban socio-economic ideas expressed through a land system. This meant that the structural and functional characteristics of land use could reflect/represent the outcomes of socio-economic processes. To support the idea, landscape could be defined as quantitative indices to describe structures and patterns of land based on information theory. The

definition is an ideal means for describing and quantifying the degree of heterogeneity of land and settlement (Kronert et al., 2001). A number of researchers in architecture and urban design who studied the models of settlement patterns had surveyed and listed the prototype forms at a city scale. For example, Lynch (1981) proposed that there is spatial hierarchy within the organisation of the central place of a city. Considering the form and structure of contemporary cities, every city has an obvious centre, and grows in different forms which are; a) the star cities, b) satellite cities, c) linear cities, d) rectangular grid cities, e) other grid forms, f) baroque axial networks, g) lacework, h) inward cities, i) nested cities, and j) current imaginings (Lynch 1981).

In order to narrow down the scope of urban structure analyses in this research, it is important to critically consider the problems of defining urban structure. However, there are still difficulties in the interpretation of relevant variables, especially because a complex system is established as a general definition of a city in any given study. The key words in the definitions which could lead to the operational variables are mostly considered too vast and/or too subjective, which need careful extraction of relevant research variables. Although this could mean that the definitions stemming from this research are too broad and lack specification and precision in terms of required data and analysis methods, there might be another way to focus on the levels/types of relations (i.e. of internal-external, spatial and aspatial). Different approaches of analysis and measurement here have similar attempts to develop research methods into a more social-scientific approach. Some obvious examples are Foley (1971), Emery and Trist (1975), and Bourne (1982) who emphasised urban structure as complex and physical driven by multi-dimensional complexity, specifically including the socio-spatial dimensions. According to this group of ideas the focus is on how to control the complex

variables of urban structure, and thus a superficial analysis of its shape or form is enough for an explanation in the study of urban structure. At this point, the study is interested in the approach. However, it still looks for supporting theories and methods that focus on the complex relationships between internal/external and spatial/aspatial aspects, in order to extend the understanding of urban structure in this research.

There are several classic theories/models from outside the architecture and urban design fields of study, which were developed for external urban relations analysis. First is the theory of urban land economics, in which Central Place (Christaller and Baskin, 1966) is the way to 'explore urban settlement patterns' with a focus on retail geography (Berry, 1967). Other ways often used for the analysis of urban structure are: density gradients and classic models using the descriptive analyses of the spatial patterns and mixture of social characteristics in the city (Herbert and Johnston, 1976), concentric zone theory, sector theory and multiple nuclei. The existing analytical concepts and methods of classic models have remained an essential component in describing and explaining urban social patterns in a broader context.

However, most studies stress the importance of external relations to urban structure and have agreed on the general conclusion claiming that socio-economic processes affect urban change. Some important examples include the works of Seto and Fragkias (2005) and Anas et al. (1998) on socio-economic changes in urban areas; however, receiving little attention are those studies of physical processes associated with urban land use change and the underlying social, economic, and political factors that can lead to certain spatial configurations and land use change. This area is addressed in this research.

Another group of studies are those focusing on internal relations and individual factors, and researchers in this area have developed and proposed ways to analyse the internal

relations from several approaches. For example, system theory (Bourne, 1982) has provided criteria in four aspects which are: 1) context, 2) macro-form, 3) internal form and function, and 4) organisation and behaviour. On one hand, it seems that this model covers all the methods which have been used in the field. On the other hand, the disadvantages of this model are its complexity and dependence on the interpretation of each individual researcher. Moreover, there is no suggestion on how to analyse the whole, due to all variables/factors being analysed separately. It is worth mentioning one study from the socio-psychological perspective, (Festinger et al., 1950) which analysed the patterns of friendships among residents in a married student housing complex at M.I.T and established the pattern of the physical environment which influenced the number of chance contacts. It thus started to give a clearer understanding of how internal relations, which reflected the users' behaviour/relations, became important in urban structure analysis and how they could be measured.

In the fields of architecture and urban design, the studies of urban development often focus on the study of the physical dimensions in terms of concept, analysis, and measurement. For this reason, they are limited in understanding the process of urban development particularly in terms of structure and relativity/connectivity that has been changing in relation to relevant social, economic and political dimensions. The focus on urban 'structure' analysis, derived from urban studies, is consequently considered as the most relevant conceptual approach for this thesis. The different perspectives and standpoints in the literature have revealed various dimensions concerned with the processes of urban change and not only the physical built-environment. More importantly, they point out the need for the further development of more appropriate theoretical frameworks. Even though being criticised as imprecise, deficient, and diffuse

in the context of contemporary urban studies, the idea of ‘internal-external relations’ from urban structure studies can be strongly linked to ‘spatial configuration – social dimension approaches’, which are explained in more detail in the next section.

GLOBALISATION AND URBAN DEVELOPMENT

Multiple Social Dimensions of Globalisation

The study of the relationship between social development and globalisation is a relatively new area. Globalisation as a social phenomenon has been influencing worldwide urban development since merchant trade between countries began (Smith and Nemeth, 1986). However, the effects have become more obvious and rapid in the contemporary world after the end of World War II. The rapid development of globalisation has been facilitated by the adoption of globally linked stock and financial markets in the 1950s, the progressive development of communication, transport and new technology in the 1970s, and a paradigm shift in people’s sense of ‘time and space’.

The free trade concept, or capitalism of the global economy, has been a dominant economic model exported from Western countries to other parts of the world and soon became to be seen as essential for successful economic development. The growth of the industrial sector was seen as a substantial process of economic development which encouraged urban development and led to modernisation (Hoselitz, 1960; Hackenberg, 1980). On one hand, the industrial revolution in many western countries significantly generated new characteristics and expansion of urban areas that produced high GNP (Gross National Product) which has become the new index to define ‘wealthy’ and ‘successful’ nations. On the other hand, such development has also been followed by

the impacts of industrial development, such as economic recession, environmental problems, urban decline and emergence of suburbanisation due to increasing population density in particular areas and the deterioration of urban properties (Balchin et al., 1995).

In recent years, there is agreement among different disciplines that globalisation is a complex issue with a number of dimensions. A social aspect standpoint views the world as a whole in terms of knowledge transformation and information (Robertson, 1992; Dertouzos et al., 1989). Globalisation can be defined as a multi-dimensional process and intensification of worldwide social relations, "…which link distant localities in such a way that local happenings are shaped by events occurring many miles away and vice versa." (Giddens, 1990, p.64). Furthermore, "Globalisation has had profound effects upon urban social geography," and on the changing economic context of city life (Knox and Pinch, 2006, p.33).

The above argument suggests that globalisation may begin from an economic aspect however it then leads to fundamental changes in the other aspects of social and urban life. The influence and impacts of globalisation can be extended to be linked to behavioural aspects as well, as revealed in many studies of relationships among the issues of class, consumer culture and civil society in contemporary Southeast Asian cities, (Clammer, 2003) which pointed out that globalisation dominated the cultures of urban spaces in terms of consumption patterns, taste, architecture, and media, among others. Increasing pressures between global and local factors such as transnational/ multinational versus traditional/local trades, can lead to conflicts and discrimination in society. An important aspect raised in relation to socio-economic urban development is

the emergence of a new middle class, especially in Asia, which brings about changes in economic structure as well as consumerism.

Globalisation in Relation to Urban Change

The previous section showed how globalisation has influenced multi-dimensional aspects of the world including what is considered to be social 'mainstream' and urban development. The relationship between globalisation and urban change can be linked to what defines urban structure. The development of urban structure is a complex process linked to human interaction, which has been changed by underlying economic, political and social influences over time. Globalisation also involves the concept of urban structural change.

Globalisation in relation to urban change may be seen as negative as well as positive. The processes and results of globalisation in most cities share similar characteristics (Taylor et al., 2007). Urban studies literature views globalisation as creating rapid and uncontrolled urban expansion (Webster, 2002; Dick and Rimmer, 1998). A similar global trend of urban development is the shifting from a rural-agricultural to an urban-industrial base, and the development of modern services. Industrialisation has been established in the context of Southeast Asia since the 1960s (Hackenberg, 1980); and the process of changing to industrial production is also known as urbanisation in the context of developing countries. Studies of the urban economy have revealed that the economic structure of Southeast Asia has changed during urban development (Davis and Henderson, 2003). Rural areas, which were green/agricultural areas, have been changed to industrial usage - typically developed with excessive land consumption and pollution. More recently, consumerism has been revealed as impacting on changes in urban form and structure and has been shown to contribute towards urban centre

decline, suburbanisation, segregation and exclusion in urban spaces during globalisation processes (Potter and Lloyd-Evans, 1998; Bauman, 1998a; Marcuse and Kempen, 2000).

From the perspectives of architectural and urban design, the critiques of modernisation and post modernisation, developed in relation to globalisation, has become important. For example, in the classic book 'The Death and Life of Great American Cities' (Jacobs, 1961), the main idea was to critique modernist planning, which discarded a human dimension by demolition, or renewal as the author claimed, which destroyed communities and brought about isolation and separation in urban spaces and their usages. Supporting sociological research suggested that segregation should be viewed as part of the identities of contemporary modern and global cities, particularly in developing areas (Marquez, 2011), however with a caution that it could also be a symptom of urban land use conflicts.

Even though globalisation is not a new issue, its recent impacts on developing countries are particular noteworthy (Harvey, 1999). There are shared characteristics among developing countries and Asian cities, in which their contexts have been gradually transformed and influenced by western culture in relation to everyday urban/modern lifestyles. The urban structure and form of the cities have been developed in a similar way to western culture in terms of consumption patterns, popular culture and the built environment (Potter and Lloyd-Evans, 1998). In the case of urban development in Asia, globalisation not only drives urbanisation but also nation-building (McKinnon, 2011). In studies of urban contemporary Southeast Asia, globalisation (meaning here urbanisation and modernisation) is notably identified as impacting on local/village

economies and leading to fundamental structural changes since the early 1960s (Rigg, 2003; Hackenberg, 1980).

Global Concepts to Local Realities

A large number of urban studies have involved the issue of the impact of globalisation on urban development. During the modern age of urban design and planning the City of Chandigarh in India (developed by Le Corbusier in 1947) and Brasilia in Brazil (developed by Lucio Costa and Oscar Niemeyer in 1956) were once criticized as failures of planned modern cities which enhanced the negative impact of new road networks among other socio-spatial problems. The global concept of trade is also geared towards the usage of new technologies (such as communication) and freedom as described in neoliberalism that has influenced the transformation of economic structures and impacted on urban policies worldwide and thus complicated inequality or urban justice problems (Parnell and Robinson, 2012). Imbalances in economic and social distribution were generated instead of the ideal to deliver fairness and equal opportunity for all, especially to poorer urban inhabitants, who have less access to modern technologies and tools in city planning, housing and facility construction.

A reason why global concepts such as zoning systems in planning and free trade policies, could not save today's cities from failure was because these ideas were not updated with the rapid changing global realities. Most theories and concepts of urban development were developed in the global North from past issues, with solutions that have been used in today's developed countries. However, the issues of the global South, stated by Roy as 'the dichotomy of First World "models" and Third World "problems" (Roy, 2005, p.147), started when these developing countries inherited urban policy and planning systems from developed countries during the era of colonisation/imperialism.

His study of urban informality (Roy 2005) highlighted the “unplannable” situation of global South in which the division of the “authorized” and “unauthorized” were pointed out as bringing about failure and injustice in urban planning. Further supporting evidence by Watson (2005) critiqued modern urban policy that favoured global investment causing governments to ignore the closing of local smaller businesses in city centres. Unaffordable housing drives the poorer inhabitants to live in squatter settlements and causes urban expansion at the fringe of towns and cities. A number of studies also pointed out the failed efforts to control the informality of urban movement (Roy 2005) by using modern or top-down planning policy, such as zoning, land use control and regulated land ownership, which often ended up in slum clearance and other urban renewal schemes that did not solve the city’s problems of urban expansion/sprawl and inequality such as in land use conflicts.

Currently the studies of contemporary cities have been mostly critiques of the reality and practice of urban development influenced by globalisation. They also strongly suggest the importance of local context and thus require the development of alternative ideas and theories directly based on the global South (Robinson, 2013; Parnell and Robinson, 2012). For instance, Ong (2011) expressed that western context is not necessarily referred to in the case of the diverse and unique context of Asia. Likewise, Roy (2005) recommended the idea of giving priority to ‘people’s capacities/livelihoods’ in the developing world, rather than the ideology of aesthetic and physical urban development that stemmed from the developed world. Finally Watson argued for policy making that should be fundamentally adaptive focusing on the ‘interface between different systems, to develop urban development approaches which are more

appropriate to the conditions of rapidly urbanizing and poor cities" (Watson, 2008, p. 2270).

As urbanising populations of global South have become the focus in recent urban studies, globalisation can be viewed as a mainstream driving force influences urban development in a one-way top down direction, manifested as "the world as a whole". However this is a conceptually limited and inadequate approach based on free market ideas and western dominance as globalisation has differential impacts particularly in the global South and is dynamic and sometimes contested at the local level. It is clear from the work of Roy (2005) and others (Parnell and Robinson 2012) that globalisation is not a simple one way top down process but in the global South can be dynamic and contested. There is on the one hand the informality of national and local patronage politics and influence and on the other hand weak democracies with strong centralised state control which results in limited dissent and protest as in the case in Thailand. Therefore globalisation as expressed by local retail developments by multinationals may happen with little regulation and local tensions which are manifested by muted small scale dissent. This research study explores the complexity of the impacts of globalisation on retail development in medium size towns in Thailand as a case study in the global South.

SPATIAL POLITICAL ECONOMY APPROACH

Linking architecture and urban design to the impact of globalisation on urban development has generated interest on the influence of multi-dimensional socio-economic issues. This is pertinent in particular to economic and political issues, in which these dimensions are mostly dominated by processes of globalisation as a

mainstream development. Architecture and urban design frameworks and methodologies focusing only on urban structure seem to be inadequate in explaining complex relationships. In order to develop a conceptual framework this research needs to acknowledge the limitations of existing individual theories and concepts. Broader theories of social science, such as the theory of urban space which was often quoted and broadly used as a major theory in, in human geography and urban sociology (Westin, 2010) need to be incorporated. Among the recent urban studies literature, Alexander (2006) has addressed spatial political economy as a new approach for contemporary architecture and urban design research to address the weaknesses of their theoretical frameworks.

A spatial political economy approach is used in this study to complement the dominant spatial configuration framework and methodology. This strengthens the conceptual framework by being more contextual and highlighting the impact of the complex dynamics of political and economic policies at the national regional and local levels on retail development form and pattern in Thai medium sized towns. The neo-liberal approach to globalisation as the dominant explanation of a top down one way process is therefore moderated by the use of a spatial political economy approach combined with spatial configuration to reveal the complexity and multidirectional dynamics of globalisation on retail developments in these towns.

Urban Space as a Social (Re) Production of Urban Development Processes

The spatial theory of Lefebvre has heavily influenced urban studies, particularly the field of human geography. He drew attention to the concept of ‘everyday life’, in which he criticised its control by capitalism. The essence of this concept has been continuously pursued in ‘The Production of Space’ (Lefebvre and Nicholson-Smith, 1991), in which

it was proposed that urban space is involved with social dimensions and political power and therefore, "(social) space is a (social) product ...the space thus produced also serves as a tool of thought and of action ... in addition to being a means of production it is also a means of control, and hence of domination, of power." (Lefebvre and Nicholson-Smith, 1991, p.26) Linking the concept of globalisation to contemporary cities, the processes of globalisation also generate the, "dynamics of capitalist urbanisation," (ibid) and also bring about conflicts, which increasingly impact on society on a greater scale.

In this approach, urban planning can be conceived as a tool to direct, lead and control the power and rights of people in society. Urban space is critiqued as creating uneven development in urban landscape and policy which brings about disagreement, conflicts and fragmentation in society, as studied by many urban social geography scholars (Harvey, 1985; Harvey, 1996; Smith, 2008). Harvey (2003) further develops the social point of view to urban structure developed by Lefebvre. Harvey (2003) created an argument for individual and collective rights in which everyone should be able to use urban space equally. He also explained how everything was influenced by the processes of capitalism. An example of this was the 'mega scheme' in urban planning, or re-shaping of Paris, in the 1850s in which economic crisis and political instability drove the major transformation of the city. Harvey also criticised this transformation of urban development as bringing about urban structural changes into 'a whole new urban way of life' which has resulted in the city as a centre of consumption, tourism and pleasure. The concept of spatial theory reveals the importance of social and political dimensions, which shape the landscape and urban space.

Urban Development Policy in Relation to Economic Driven Forces

Economic forces interacting with government policy is a key factor impacting on urban structural changes (Bourne, 1982; Scargill, 1979; Bertaud, 2002; Davis and Henderson, 2003). The unique form of each city not only reflects the development of urban planning but also establishes land prices, population densities and patterns of social interaction within the city. In principle, the pattern of land use and its value is generated by price mechanisms based on supply and demand in the property market (Balchin et al., 1995) with the exception of some government regulations, such as land use regulation or public service investment, which aim to reduce conflict and balance profit and non-profit land uses.

Proponents of neo-liberalism argue that an absolute free market economy can bring about successful and efficient economic development, as well as just competition and distribution (Kotz, 2002). An important economic mechanism for land use planning in market-oriented systems, including advanced capitalist systems, is that the property market should be balanced between supply and demand, as well as competing and conflicting uses, at least for a particular period. Demands for land or property normally come from both public and private sectors (Hammett, 1982).

Neo-liberalism has been critiqued in many ways, beginning with its concept as applied to the 'real world'. Neo-liberalism based on the economic model attempts to transfer/reform material into capital, such as the concession and privatisation of public properties/services. Large urban projects bring about huge demands of capital, construction and labour, which greatly affect the pattern of urban land use in particular areas. In most countries of the global South, the widespread use of informal influence and patronage politics and networks is one of critiques of neo-liberalism as these

informal relations become the driving force behind urban policy by encouraging/ supporting development in particular locations and scales to favour political or elite consumption practices (Brenner and Theodore, 2002; Davis and Henderson, 2003). In some cases urban policies favour the promotion of business investment, as encouraged by direct financial support or tax incentives. Even in developed countries, the imbalance of market-oriented policy in some situations seems to increase the tension in urban land use in terms of competitiveness and fairness (Brownill and Carpenter, 2007). Neo-liberal policy is thus perceived as a significant factor in creating inequality, injustice and urban problems in both physical and social terms. The inclusion of the spatial political economy approach in this study enables a more nuanced view of the impact of neo-liberal globalisation.

Political Economy in Urban Development Processes

Architecture, urban design and planning are often criticised as being agents of the state used for the social control of its citizens, implying that it can be a tool of class division in politics. Harvey, for example, revealed that the global economy significantly alters landscape transformation by absorbing the surplus capital in terms of employment and labour, construction costs and resources, and the system of debt-financing (Harvey, 2003). Therefore capital is represented in the form of a physical landscape, an image created through the values, "to enhance the progressive accumulation of capital on an expanding scale." (Harvey, 1985) General ways in which a market-oriented economy contributes to urban development, which are claimed as being the best use for top-down urban planning, are destruction and (re) creation (Brenner and Theodore, 2002). The former mechanism is to eliminate and remove something and/or relationships in the existing (social) system, for example, slum clearance and increasing surveillance in

urban spaces. The latter mechanism emphasises the creation of consumption, such as privatised urban spaces, gated-communities, and urban renewal projects, which reflects the capital absorption and has an instant effect on land use patterns.

Further evidence can be found in the case of industrialised areas that alter urban spaces and everyday social life as research has revealed the impacts of industrialisation—particularly related to environmental pollution and urban decline (Clark, 1989; Brenner, 2000). For example an uneven distribution of industrial development has been found to be linked to the decline in urban landscape including surrounding communities, deeply affecting the social life of inhabitants (Mah, 2012). In the research, Mah does not only reveal uneven development rooted in planning policy but also socio-economic differences and discrimination.

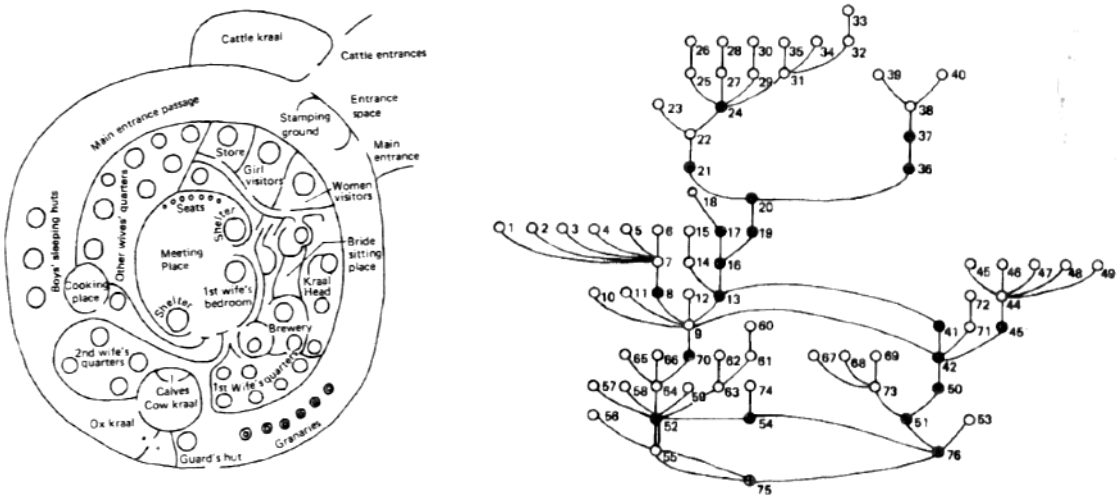
From the standpoint of the political economy, globalisation influences socio-economic structures including the processes of urban development and policy. Expansion of urban modern developments particularly in developing countries is pointed out as a result of inappropriate market-oriented economic initiatives leading to both environmental and social problems. Contemporary urban studies have questioned the rationale neo-liberalism in terms of its relevance to the context of parts of the global South where poverty, informality and traditionalism are rooted in peoples' lives (Ong, 2006; Parnell and Robinson, 2012). In this research study a conceptual framework that can illuminate transitional urban development is proposed at the end of this chapter in which globalisation is approached as a dynamic process which generates complexities at a different scale. This conceptual framework will be used in the research study (further detail in Chapter 3 and 4).

SPATIAL CONFIGURATION OF URBAN DEVELOPMENT

The problem with most urban structure studies is the limitation of existing architectural and urban design theories and research, particularly when the literature only agrees on the conceptual level that an urban area or city is a complex and dynamic structure relating to multi-dimensional social issues. Several studies of the relationship between space and social life have been conducted through a trial-and-error approach with limited understanding (Hillier, 1996a). Even though two main types of relations of the properties of urban space, internal and external, were found in the literature, a number of current research studies only focus on the external relations in the structure development process. A small amount of research has tried to clarify the process in a more rational way to show how internal spatial relations can connect with those external relations. Spatial configuration, which aims to study the link between both kinds of relations, has therefore become important and is the main approach of this research to address the theoretical gap in the field of urban structure development.

Natural Movement of Urban Spaces

Figure 2.1 Village layout (left) and its justified permeability map (right) in the concept of Social Logic of Space



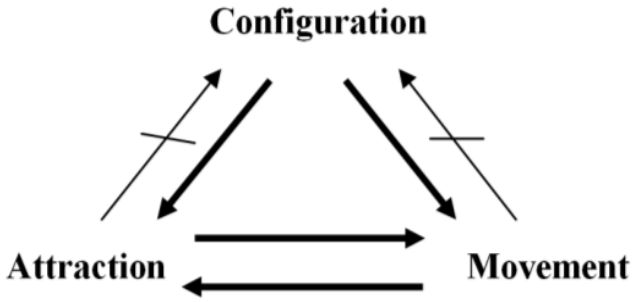
Villege layout **Justified permeability map**

Source: The Social Logic of Space (Hillier and Hanson, 1984, p.164-165)

Bill Hillier and Julian Hanson (1984) attempted to establish a new theory and method of 'space syntax' to understand the social content embedded in spatial patterns. The theory was developed following the idea that descriptive analysis alone is inadequate to explore these complexities, and therefore it adopts a scientific approach and method. In the early period of their work, they decoded the element of space by the analysis of subdivided cells (further details in methodology chapter) and applied to the settlement layouts in different small-scale buildings and villages from various cultures. Using this framework, applied to further complex systems, the 'justified permeability map' (Hillier and Hanson, 1984, p.165) (Figure 2.1) has become the basic method which provides simple mathematical data for statistical analysis using computer software. The outcome of the study suggested that "all societies have mechanisms… for the conscious control

of disciplines," (ibid, p.222) which means the fundamental structuring mechanisms, or the social logic of space, could be found in any society.

Figure 2.2 Relation diagram



Source: Applied from Hillier et al., 1993, p.31

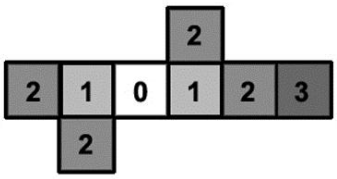
The theory of natural movement as the main theory developed for space syntax, argues that, "the configuration of the urban grid itself is the main generator of patterns of movement," (Hillier et al., 1993, p.29) in which the configurational approach is defined as, "the study of relations which take into account other relations in a complex." (Hillier, 1999, p.2). The conceptual approach is the relational model of three dimensions (Figure 2.2) - configuration, attraction and movement- which are applied to examining the situation in real urban space. It illustrates the possibility that configuration can influence an attractor (such as a shopping centre) and the movement of people, but both of these cannot alter configuration. This means space syntax claims that spatial configuration is an independent factor which influences movement and also urban land use.

Spatial Configuration Analysis and Measurement

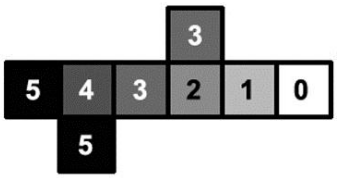
Spatial configuration is, "The way in which the spatial elements …are linked together to form some kind of global pattern." (Hillier et al., 1993, p.29). Reflecting its positivist

theoretical approach, space syntax stresses that the study of urban structure has to be analysed, measured and observed mainly in a quantitative way. Space syntax strongly proposes the use of statistical analysis with specific computer software as well as empirical observations based on its theory. To make the processed data more accessible and understandable, the calculated results of the spatial configuration of a city are represented by simulation of colour-shade charts, which give the ability for comprehensive analysis of relevant topics. It might also be a useful tool, particularly for architecture and urban design, for predicting future land usage by considering the changing pattern of movement and area network or searching the pattern of a settlement in the past.

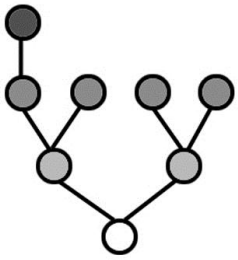
Figure 2.3 Analysis of the subdivided cell



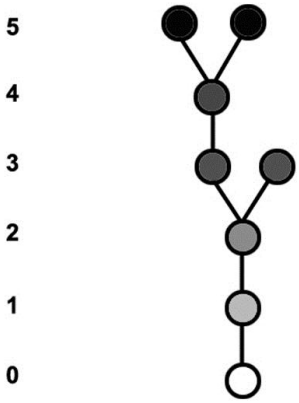
A: Depth value calculated from cell position '0' is 13



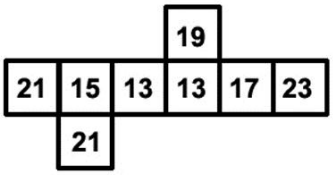
B: Depth value calculated from different cell position '0' is 23

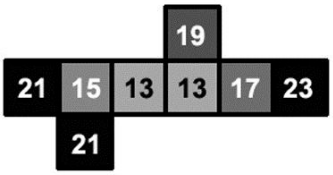


C: Justified diagram from A (depth is 13)



D: Justified diagram from B (depth is 23)





E: Depth calculated from every cell positions

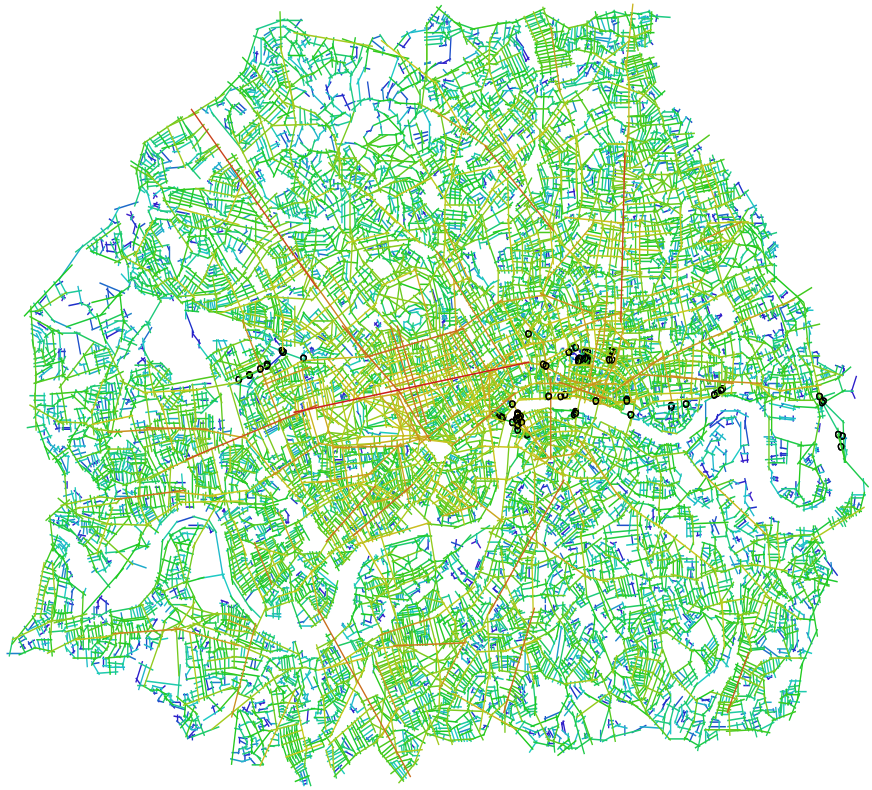
Source: Applied from Hillier et al., 1993, p.148

From the *Social Logic of Space* (Hillier and Hanson, 1984), space syntax analyses the urban structure fundamentally by reducing, the complexity of qualitative and physical properties to the simplest elements, which are a one-dimensional element called the 'axial line' and a two-dimensional element called 'convex space'. From the example of the analysis of the subdivided cell (Figure 2.3), the analysis of one imagined system can be placed in real situations, such as rooms within a building or a row of buildings along

a street, by starting from the position of cell ‘0’ with the value of its depth as zero (A), and then the next cell is 1, 2, 3,… respectively until the total depth, (i.e. total counts of connecting points) which is 13. On the other hand, when the counting starts from a new position at the far end of the system (B), the total depth is 23. Both cells A and B are shaded from the most white to black, representing the depth value from the most shallow/nearest to the deepest/furthest cell. It should be noted that even within the same physical environment, there is a difference in terms of accessibility depending on the connectivity between each space. These examples can be unfolded into justified diagrams, or j-graphs, as shown in C and D. When calculating by the same rule, every cell within the system has its individual depth as shown in E. This ‘depth’ value, as generally used in space syntax, is called the ‘Integration’ value.

The space syntax method has been developed into computer software for the analysis of further complex systems. There are various types of applicable software, depending on the scale and purpose of the research objectives. *Depthmap* software is typically applied for urban-scale purposes by calculating the average depth, or Integration, of all urban space in the network. The software also represents the levels of accessibility in different modes of analysis, such as Global and Local Integration, into colours from red to purple suggesting a low to high level of Integration respectively, which is called an axial map (Figure 2.4). The coloured map therefore illustrates, “the probabilistic field of potential encounter and avoidance.” (Hillier et al., 1993, p.4).

Figure 2.4 Axial map of London



Source: www.spacesyntax.com

The other half of space syntax analysis is empirical observation (Hillier et al., 1993) by systematically collecting and recording data. There are six methods suggested in general for data collection: 1) existing built-environment conditions such as building use, physical condition and street facilities in the studied area; 2) traffic movement data of different types of transport modes by using the gate observation method; 3) social interaction in public space by using the static snapshots method; 4) movement decision or way finding by using the movement traces method; 5) directional splits which record the directions of movement at a junction; and 6) other kinds of data gathering such as questionnaire or time-lapse photography to record and observe behaviour in the studied area. The detail of these methods, such as date, time, number of units and procedure in

data collection, are further explained in Chapter 3: Research Methodology. It is important that both software analysis and empirical study are analysed together following the research questions and research design by using statistical analysis to prove the hypothesis or address the relationships between variables.

Spatial Configuration Analysis of Urban Contemporary Issues

Movement Economy and Centrality as a Process

The natural movement theory has retained its main essence in recent studies of urban development, which examine cities as a 'mechanism' for generating (social) contact, and is also clearly readdressed in Cities as Movement Economies (Hillier, 1996a). The set of works from the space syntax approach thus aims to explain, "the aspects of a generic mechanism through which human economic and social activity puts its imprint on the spatial form of the city." (Hillier, 2001, p.02.2) The location of retail or commercial agglomerations in a town centre stems from the diverse potentials of the different areas and space syntax explains such differences as the spatial configuration that generates inequality of movement in urban space. This also helps explain why retailers seek the best location for their shops; and the best location thus means the most frequent thoroughfare, which is often suggested by its linkage to other routes and areas. For architectural and urban design researchers, this approach has increased awareness of the way to understand and properly deal with matters concerning cities or towns that are dynamic in scope and less static or focused on a single building or street block.

One of the key pieces of literature is Centrality as a Process (Hillier, 1999a), which studied the dynamic spatial process of the economic life centre of a city/town. The study revealed that centrality is a spatially-led process in which, "the changing states of

centrality are the products of continuing spatio-functional processes." (ibid, p.109) The economic process drives the development of town centrality at two levels: local and global, in which both obviously impact on urban changes in several processes, such as urban block/grid intensifying, shifting in centrality and also the emerging of a local centre. The findings suggested that the spatial characteristics of town centres in the UK have been developed in a dense grid-style which relates to the prosperous and successful economic centre, or 'life centre'; whereas the linear-style commercial areas were found to be less successful. The study also revealed that these smaller centres were possibly developed as sub-centres, in which their spatial characteristics linked more to the 2-step Integration (R2) than Global Integration (n-step Integration or Rn).

Natural Growth of Cities

The natural growth process of a town or city allows the natural order and hierarchy of urban space to be constructed, in which this spatial structure generates the relations among function, land use, and activity. The urban centre holds the city's significance of mixed social and economic activities, especially the historic centre which is generally recognised as a sensitive area with rich culture. The study of Organic cities in the Islamic Traditional context of Iran and also the Western Medieval context of the United Kingdom (Karimi, 1997) has contributed to the organic city approach which is often defined as chaotic, irregular and difficult to study. It confirmed that space syntax analysis increased the ability to understand the city more objectively and precisely. Two types of spatial configuration were found in the case study examples, which are linear and cluster cores. The area with the highest Integration, which the study called 'syntactic centre', matched to the location of the main bazaar and market. Both Iranian and British syntactic centres mostly shared the similarity of being dominated by a single

main commercial street (or high street). The syntactic centres are variably compact with dense street connections.

Another comparative study of traditional and modern cities (Karimi and Motamed, 2003) also addresses the failure of modern planning in the twentieth century, particularly the neglect of the urban structure as a whole. Space syntax analysis in this case revealed the contrast between old and modern planning approaches in terms of traditional living/lifestyle context consideration. It stated the changes of urban structure before modern planning as expressing continuation and harmony with environment and respecting the grid system of existing streets. In the case of Manama and Muharraq historic centres in the Kingdom of Bahrain (Al-Ghatam, 2003), the old town centre lost its importance after a change of land use due to the development of a residential complex for retirement, which was a large-scale self-contained urban project, following modern development policy. The research also showed the slight shift of Integration of the core of the town, as a result of the changing land use.

Similarly in terms of critiques of new planning policy, a study on the survival of bazaars (Azimzadeh, 2003) further stressed the impact of modernisation development on commercial areas in terms of new street generation, particularly in the case of directly constructing new roads near historic centres, land reform and rapid urban expansion spreading out with the new roads. These modern development policies led to changes in spatial structure of the historic areas, including spatial segregation and urban decline. On one hand, the exemplified changes in organic towns revealed the sensitive urban development issues of some particular areas. Applying modern planning to these areas can significantly change the spatial structure of the town. It should also be noted that some planning regulations might create even worse solutions, such as the conservation

policy for old town centres in Chile (DIAS and TRIGUEIRO, 2012), in which the strong restrictions on preserving the old town worsened the declining state of the old centres.

Spatial transformation in contemporary cities

In contemporary urban development, several studies drew attention to the spatial configuration approach in shopping areas, which addressed the significance of shopping in town centres as encouraging complex social and cultural interrelationships in urban society (Williams, 2003). Van Nes (2001) studied the street grid structure and pattern of shops in UK town centres aiming to understand how new roads and buildings impact on the spatial and functional structure of town centres. The findings suggested that the location of prosperous shopping areas were related to the most accessible streets of the towns – or having the highest Integration value/degree. The findings also showed that the mean values of Local and Global Integration had declined in the town centres since new roads were constructed, particularly in the cases where large new roads were developed with few connections to the existing major roads that directly led to the town centres. While Global Integration shifted from town centres to the new road locations, where new shopping streets emerged nearby, a number of shops located outside the ring road were also found to be closing down.

In Amsterdam (van Nes, 2005), the scale of urban development influenced the type and characteristics of some shopping areas. The older town structure was commonly developed in high density streets or roads. The locations of successful shopping areas or markets were usually linked to ‘one topological step’ away from the main roads or important squares. Local shops tended to be located on the ‘two-step Integration’ (R2) routes, and were found settled in more linear than cluster patterns. Modern shopping

areas were situated at locations easily accessible by car and were usually connected to highways (see also van Nes, 2003). Considering the relations among configuration, attraction and movement in the natural movement concept (Hillier et al., 1993), the study also explained the reasons why different transportation modes and urban scales could bring about different characteristics in shopping areas. Relations between attraction and movement were clearly linked to the public transport dependency of people in the past, while travelling to out-of-town locations nowadays was easily accessed by private car. Shopkeepers thus had enough reason to locate their shops at the 'points of interchange'. Considering the ways in which spatial configuration affected attraction and movement, the new modes of transport also created new movement patterns; whereas the new road networks directly changed the urban grids leading to the change of attractive retail locations. As van Nes stated (2005:185), "shops seem to adjust their location to the way people move through public spaces - it is by foot or with private or public transport."

There is still a research gap in the study of spatial centrality and political issues particularly in the study of centrality and economic development. As an attempt to fill this gap as van Nes (2007) pointed out, political forces can interrupt the process of the natural movement of urban structure, as explained by the case study of Rijnland Region of Amsterdam, which was planned and implemented without empirical evidence. The studied area had spatial potentiality and was well-connected to other parts of the region. However the strict planning policy had controlled and prevented the areas from natural economic development and the result was a weak town centre.

Spatial Segregation

Hillier (1996a) has critiqued the concept of modern planning, for example, 'disurbanism' which is lowering density to decrease problems in a city. He exemplified how control policies and ordinances had intervened and damaged the continuity of spatial structure, which would otherwise generate people movement naturally based on space syntax theory. In general, segregation has become an aspect related to housing issues and often is focused on in large city studies, with social problems such as social inequality among different groups/ classes of people, particularly in areas with people of many different ethnicities and religions. Nonetheless, the spatial segregation in contemporary urban development within the global economy increasingly stems from the issue of social and economic differences. From the literature review on the spatial transformation of both organic or traditional and contemporary towns, segregated development is a common pattern mostly found in rapid and uncontrolled urban development (Lynch, 1981; Jenks et al., 2008). An important spatial feature of segregation is low Intelligibility (Hillier, 1996a), or higher 'depth' (Azimzadeh, 2003), which means the area is difficult to access by the public when compared to other areas in the town, and has been commonly explained in most studies in the field to be linked to other social dimensions such as social segregation and exclusion (Vaughan, 2005; Dalton, 2007), as well as anti-social issues such as crime rates in isolated areas (Friedrich et al., 2009).

Aside from those studies on a large urban scale, there was a group of studies of medium-scale growth patterns through case study towns in developing country contexts, such as Brazil (Medeiros et al., 2003). These focused on three aspects of spatial structure that could reflect either compactness or sparse development; they are grid

Integration, compactness and form of Integration core. The compactness as usually found in organic town development is in fact another version of the sparse, dispersal or discontinued pattern (Hillier, 1996a) in the traditional urban fabric. The results showed that the Integration cores of the towns had changed slightly from the original locations since the new urban planning was applied to the areas. It also revealed that the new urban core had developed in low density and was more dispersed at the periphery. The study proposed two measurement methods for types of compactness, which were Compactness A and B (further detailed in Chapter 3). Both used number and length of axial line, immediately derived during the spatial configuration procedure (which mean both require the same materials). These two types of compactness measurement revealed the same results in the case study analysis.

Limitations to the theoretical frameworks and methodologies in the study of urban structure still exist particularly in architecture and urban design research. The complexity of towns and cities with the ambiguous definition of urban space makes it more difficult to understand the spatial development processes of contemporary cities in an accurate way. The spatial configuration approach based on space syntax theory aims to extend the application and explanatory ability of the research in a more rational and precise way through applied cross-disciplinary study. Many case studies in the literature review had several multi-dimensional aspects in social, economic and culture concealed in urban complexity, in which, as space syntax argued, stemmed from the spatial configuration that was the natural movement of urban grid itself. Three main variables playing a significant role in this relation are configuration (as an independent variable), movement and attraction, in which the latter two are interrelated independent variables. The approach of space syntax theory, methodology, computer software and visual

presentation should therefore be seen as the main research tool that fills in some of the gaps and limitations of architectural and urban design research. In this research study of the socio-spatial structure of retail area development in medium size Thai towns, spatial configuration analysis is used as the main approach together with spatial political economy as a secondary approach.

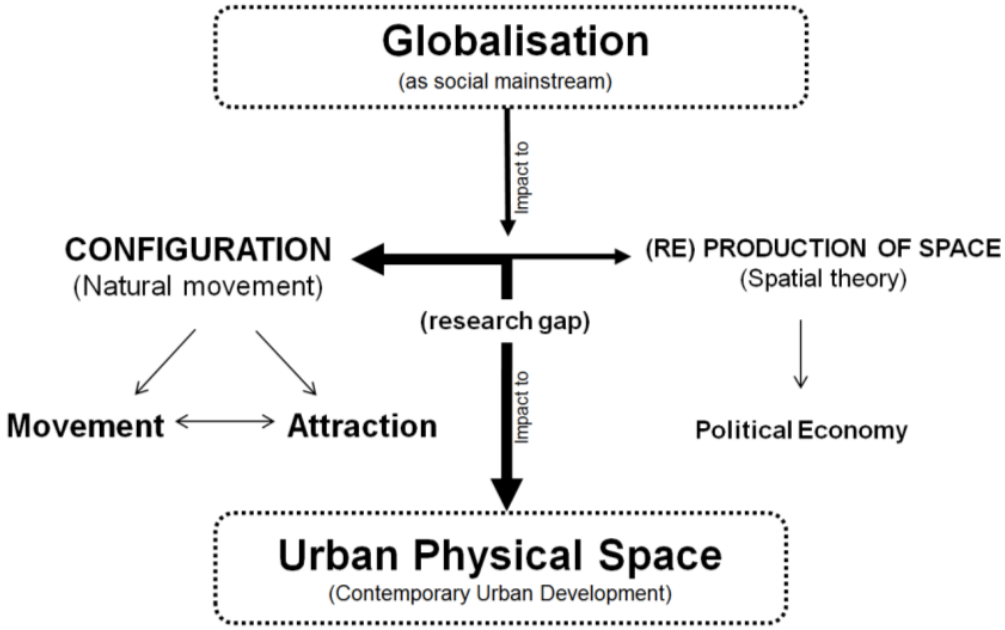
SOCIO-SPATIAL CONCEPTS IN CONTEMPORARY URBAN DEVELOPMENT PROCESS

In the context of contemporary society, towns and cities rapidly develop and change, generating urban phenomena such as urban diffusion, decline and redevelopment. From the standpoint of architecture and urban design, most studies have tended to emphasise the tangible aspects of the environment, which encouraged the interpretation, with limitations, of space at the physical level. The failure of the modern built environment, as criticised by many sociologists since the 1960s, was thus often expressed through its lack of human/social concerns of the urban structure (Jacobs, 1961; Lennard and Lennard, 1995).

From the point of view of spatial theory, Lefebvre argued that, "Space is not a thing but rather a set of relations between things" (Lefebvre, 1991, p.83), which conceptually expressed the importance of social and material/physical links. The built environment in terms of architecture and urban design is therefore clearly signified as the '(re) production of space'. From the standpoint of social geography, space is produced under the influence of capitalism and thus architecture, urban design and planning are the instruments of the state and elite utilised in order to control society. The meaning of space can be seen differently from different approaches.

With similar conceptual thinking to spatial theory, spatial configuration uses space syntax as a tool and questions the way architecture and urban design define and interpret urban space. However, it also criticises the abstract meaning of spatial theory which is difficult to operate at the level of practice. According to the scientific approach of space syntax, space should be treated as an 'object' that can be systematically analysed, measured and observed. The method proposes a rational way to extract the 'relations' embedded in urban space and thus makes possible the reconnection between the physical and social dimensions. The main argument of spatial configuration focuses on the way people move, use and live in urban spaces which affects 'natural movement' and generates spatial configurations (of urban grids).

Figure 2.5 Conceptual framework



From the standpoint of this research study, the approaches of political economy and space syntax share similar aims to uncover the ‘complex relations’ of ‘everyday life’ in physical spaces from various angles. The conceptual framework is set out in the following Figure 2.5.

From the literature review above, globalisation is conceptualised as influencing urban change in terms of diversity, particularly in the context of global South where the situations differ in perceptions/traditions from the global North. For this reason the research design is developed to prioritise contextuality, as supported by the recent works of scholars such as Roy (2005), Watson (2008), and Parnell and Robinson (2012). The conceptual framework of this research (see Figure 2.5) has adopted the two different approaches and theories of natural movement - spatial configuration (as primary) and spatial political economy based on spatial theory (as secondary) in order to deal with these complexities and dynamic issues in the transitional urban retail development of Thai towns.

In the field of architecture and urban design, multi-disciplinarily and rigorous methodology is needed to understand the diversity of urban change under globalisation. The concepts and methodology of spatial configuration analysis is a possible way to provide reasonable and practical systematic programming for architecture and urban design studies.

This research study is a contribution to overcoming the existing limitations of excessive physically oriented architecture and urban studies. The chapter has aimed to highlight the theories in urban social dimensions that provide conceptual linkages with the concept of urban (physical) structure development. It should be noted in particular how theories of space interpret the ‘meaning of urban space’ underlying political economic

forces and its relation to social life. The literature has suggested that urban space is not only related to the tangible, physical built-environment, its aesthetics or functions, but also involves multiple dimensions of complex social interactions within the urban space.

Considering these different built environment approaches holistically (i.e. of architecture and urban planning, political economy and spatial configuration), the gaps in existing research are in the area between the processes of spatial configuration and spatial political economy in contemporary urban studies. To address the impact of globalisation on urban development in the context of global South, globalisation in this research study on retail development in Thai medium size towns is viewed as being comprised of both top-down processes connected to the global political economy, and also as part of complex dynamic relations at a local level.

Changes in town centrality in relation to retail patterns will be analysed in particular by empirical case study of three towns. Medium-size provincial towns in Thailand were selected as the representatives of the transitional urban areas with intensive socio-economic activities, which are expected to reveal the complexities and tensions between the local and the global in terms of varied impacts of globalisation. The loose control of planning policy in the case study sites means that the research can distinguish the spatial processes usually negotiated between the urban space as either ‘designed’ or ‘natural growth’ or some combination of the two. Four research questions are identified for exploring the impact of globalisation on socio-spatial processes of retail development in this setting:

1. How has the socio-spatial structure of retail area development in Thai provincial towns changed over the last 50 years?

2. What are the characteristics of urban expansion in relation to retail area development in provincial towns, and does it show any features of spatial segregation in the different contexts?

3. How have the new retail developments affected the spatial properties of the main retail areas and led to the decline of older retail areas?

4. How have differences in the spatial and physical characteristics of retail area development influenced the retail behaviour patterns of users?

The next chapter will set out the methodology and methods used in this thesis to analyse the socio-spatial changes in retail development in Thai provincial towns.

CHAPTER 3

METHODOLOGY AND METHODS

INTRODUCTION

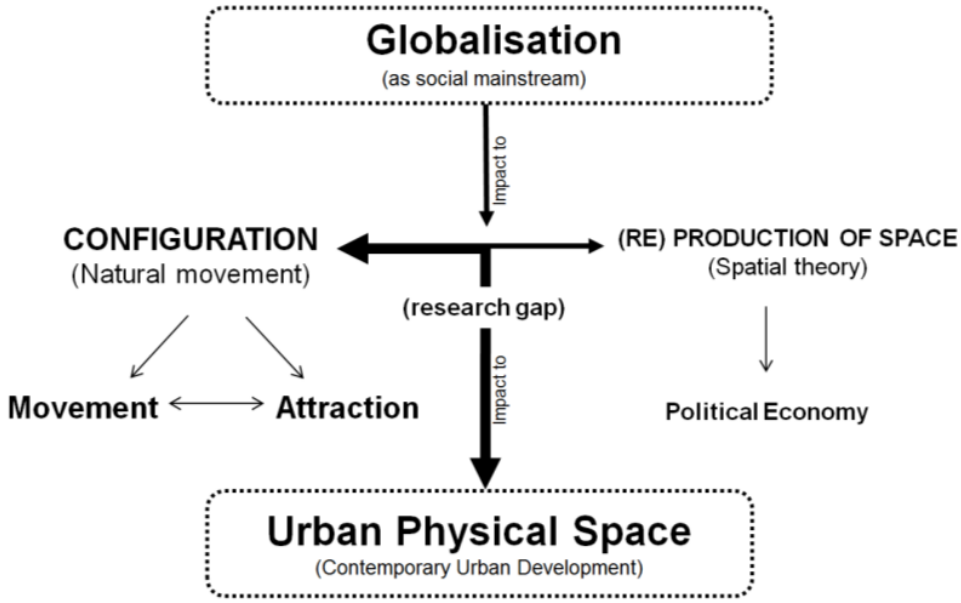
This chapter will set out the methodology and methods used in the thesis following the conceptual framework, in order to analyse the socio-spatial process of retail area development in Thai provincial towns. The four research questions were: 1) How has the socio-spatial structure of retail area development in Thai provincial towns changed over the last 50 years? 2) What are the characteristics of urban expansion in relation to retail area development in provincial towns, and does it show any features of spatial segregation in the different contexts? 3) How have the new retail developments affected the spatial properties of the main retail areas and led to the decline of older retail areas? and 4) How have differences in the spatial and physical characteristics of retail area developments influenced the retail behaviour patterns of users?

The chapter consists of five sections which are 1) the methodological approach, 2) case study selection and criteria, 3) data collection, 4) data analysis, and 5) indicator summary.

THE METHODOLOGICAL APPROACH

The figure below represents the conceptual framework. It is the same figure that was presented in the previous Chapter 2 as Fig.2.5 and is repeated here for clarity.

Figure 3.1 Conceptual framework



The main methodological approach was that of spatial configuration analysis supplemented by some emphasis on spatial political economy. Figure 3.1, shows how primarily spatial configuration concepts (Hillier and Hanson, 1984; Hillier, 1996b; Hillier et al., 1993) and secondarily the spatial political economy concepts (Lefebvre and Nicholson-Smith, 1991; Harvey, 2006; Cuthbert, 2006) have guided the conceptual framework of the research design and methodological approach of this study. A mixed method approach has been adopted for the interpretation and systematic analysis of socio-spatial changes during the process of urban retail development in medium size Thai towns in the context of global South. According to the research methodology as shown in Figure 3.2, the first set of variables focuses on configuration and urban structural analysis by using space syntax as the main research method including quantitative data and statistical analysis. The second set of variables is the data concerning the political economy which consisted of two parts: 1) secondary data analysis of documents, maps and photographs of the political economic and urban

development over time, including regulation and development plans of both regional and provincial levels of Thai towns for the spatial configuration analysis 2) primary data collection of structured observations and a questionnaire survey on socio-economic retail behaviour for the spatial configuration analysis. This was a case study of urban retail development and socio-spatial processes over time in medium size towns in Thailand with three sites or cases.

The case study method with three cases was selected to study the retail development areas of three towns which were chosen to represent the dynamic and complex socio-spatial dimensions of contemporary urban changes in the context of global South. The data analysis and discussion uses pattern-matching techniques (Yin, 2003) to explain the normalisation among case studies. The study used different research methods so that triangulation and complementarity strengthen the reliability and validity of the data set (Bryman, 2006). The case study method is sometimes critiqued as being unable to test propositions because of its lack of systematic procedures and possible biased conclusions (Yin, 2009). This research study used systematic fieldwork observation and a questionnaire to supplement the quantitative data analysis of space syntax.

Figure 3.2 Research methodology

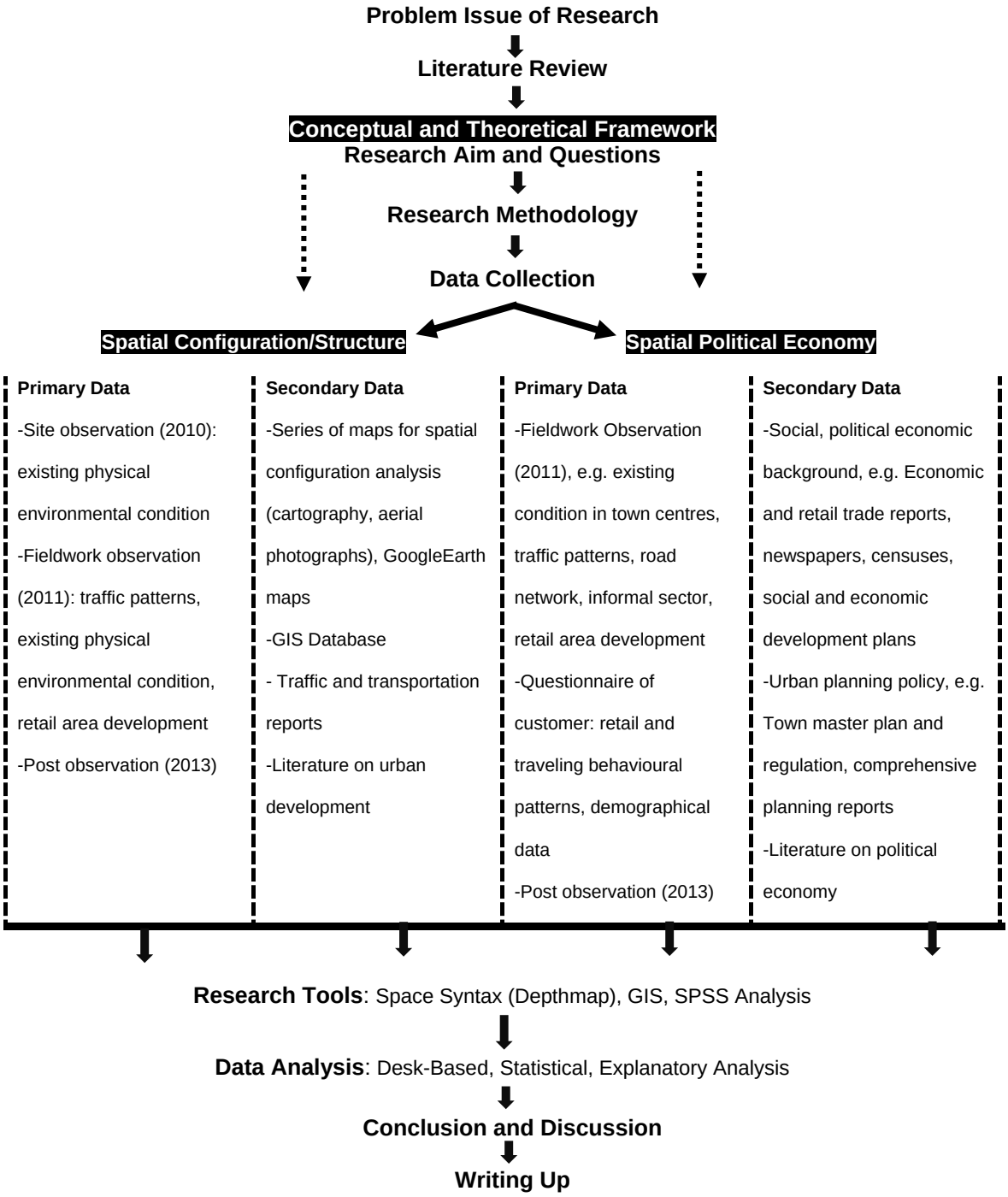
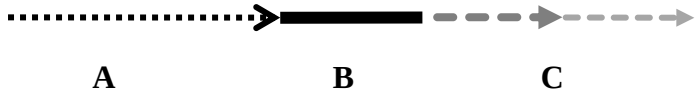


Figure 3.3 Time line of Urban Development Processes in the Research Study



A: Contemporary urban development (1960s- 2009 for this research)
B: Recent (2009-2013 for this research)
C: Future trend (2010s onwards for this research)

The research methodology (Figure 3.2) was designed to show how the conceptual framework related to the research methods used. Both the spatial configuration data and the spatial political economy data used primary and secondary data. Figure 3.3 shows the different time periods as defined in this research study.

The research methods used in addressing each of the four research questions is set out below.

1. How has the socio-spatial structure of retail area development in Thai provincial towns changed over the last 50 years?

This involved the analysis of the overall process of retail area change physically and spatially over the last 50 years (A-B), from the standpoint of globalisation and modernisation, which has influenced the process of urban development in Southeast Asia since the 1960s. Two main sets of indicators were studied; 1) *the physical urban development and urban structure of the towns* in terms of the expansion of the retail area, road network, changes in urban land use. This was measured by a series of map analysis of location, size and boundary, settlement pattern, built-up area, road network

map, urban land use; 2) *spatial structure of towns* by using space syntax as a main tool to measure the level of accessibility (Global and Local Integration values) and urban space quality (i.e. Intelligibility, Synergy) and centrality of the town (series of axial maps) (Hillier et al., 1993).

2. What are the characteristics of urban expansion in relation to retail area development in provincial towns, and does it show any features of spatial segregation in the different contexts?

The second research question aimed to explore the characteristics of urban expansion in provincial towns during the retail area development process (B), including the analysis of the urban dispersal pattern in relation to spatial segregation. Theoretically the spatial segregation pattern should be linked to social segregation and socio-economic gaps, which is also relevant to the last research question. Spatial and social segregation often result from uneven modern planning which occurs in a number of large-scale urban developments. Three main sets of indicators were studied; 1) *the physical settlements and characteristics of urban expansion*, by considering urban expansion in terms of agglomeration and continuity, variety, and density of land usage. The indicators consisted of size and location of urban area, categories of urban land use, degrees of public-private usage, Open Space Ratio (OSR), built-up area and Settlement pattern in order to measure the density of physical urban development; 2) *spatial configuration* which used the spatial properties from space syntax, i.e. Global and Local Integrations, Intelligibility, Synergy, R2, R3, Connectivity); and 3) *Spatial segregation*, the indicators were from spatial properties (i.e. Depth value, Integrations, Intelligibility, Synergy) (Azimzadeh, 2003; Hillier, 1996a), and difference between OSR and

compactness (Medeiros et al., 2003) to illustrate the imbalance between physical development and public usage density.

3. How have the new retail developments affected the spatial properties of the main retail areas and led to the decline of older retail areas?

The third research question explores the processes and trends of socio-spatial development of the main retail areas in particular, which also represents the life cycle of a town centre (A-C). The process of retail area development and redevelopment closely relates to the emergence of modern trade and the strength of the local economy, which represents the locality and conflicts in society linking to consumer patterns and socio-economic dimension in the next research question. There were three main parts to measure; 1) *physical and characteristics of retail area development process*, which this research considered location, size and boundary, settlement pattern of each retail area, and retail patterns (i.e. types of trade, building use and shop category, building condition, number of closing down/derelict property); 2) *spatial configuration patterns of retail area* by looking at spatial properties from space syntax (i.e. Integrations, Intelligibility, Synergy, R2, R3, Connectivity); and 3) *life cycle of retail area development* in which the indicators of success and decline retail area were spatial centrality or Integration core, level of accessibility, type, location, number of redevelopment projects, number and location of modern trade developments and unoccupied buildings.

4. How have differences in the spatial and physical characteristics of retail area development influenced the retail behaviour patterns of users?

The last research question aimed to generalise the differences among the different retail areas, which originated from different periods of development, in terms of physical characteristics, retail patterns, consumer behaviour and also the different socio-economic characteristics among customers (B). Two mains parts were measured; 1) *retail patterns and consumer behaviour*, which considered retail patterns (i.e. types of products and services being sold, frequency of shopping and average spend per week, reasons for shopping, time spent, travel mode and distance from home to the market or retail area) (van Leeuwena and Rietvelda, 2011; Gayler, 1980), movement patterns (pedestrians and vehicles) and interactions in the main public spaces; 2) *socio-spatial dimensions in provincial town development*, in terms of movement patterns and socio-economic interaction in retail public spaces, characteristics of transport in provincial town centres, differences in socio-economic status (O'Neill and Jasper, 1992; Gayler, 1980; Bertaud, 2003) and spatial segregation and conflicts in urban land usage (Harvey, 2003; Smith, 2008). This final research question intertwined most parts and variables of this research in order to address the socio-spatial changes of urban development process under globalisation.

CASE STUDY SELECTION AND CRITERIA

This research needed cases that would allow for the study of dynamic and complexity during the process of urban retail development which was affected by globalisation in the context of global South. Retail development areas were chosen as the aspect of urban development to research because they are sites of intensive socio-economic activities which reveal the complexities and tensions between the local and the global in terms of the varied impacts of globalisation. Secondly, the chosen cases were three medium-sized provincial towns in Thailand as representative of transitional areas in

developing countries in South East Asia. In terms of the spatial political economy, the significance of these towns was not only their positioning between natural growth and designed environment, but also because of how they demonstrated aspects of inequality in urban development bias between the capital city and the rest of the country, for which Thailand has been one of the countries often cited (i.e. primacy development) (Davis and Henderson, 2003).

Different aspects of the impact of globalisation, such as industrialisation and modernisation in relation to urban growth, have been studied in major cities contributing to some significant development planning policies in relation to tourism or historic cities, port towns and border towns. However, for many small to medium-size provincial towns there was little specific development planning that has been systematically studied (Bryce and Joint Center for Political Studies (U.S.), 1977). Consequently, this study of small to medium-size towns addresses a gap in the existing research. In the UK, these towns were often chosen for study because of their significance to the economic structure of the country (van Leeuwena and Rietvelda, 2011). In Thailand the provincial towns make up the majority of the urban areas in the country, undergoing rapid growth similar to these provincial cities in other South East Asian countries.

The selection criteria for the case study towns were that they needed to be representative of medium-size towns in the central region of Thailand, in which ethnic diversity was not a factor on the settlement pattern or socio-spatial behaviour due to different cultural or religious practices in everyday life[1]. The criteria also included the main retail areas locating within the municipal boundaries and a medium population size which was

[1] Each region in Thailand differs in religious and local culture. For example, there is a high proportion of Thai-Muslims (30.4%) in the southern region of the country(http://th.wikipedia.org)

typical of the central region of Thailand. The definition of a medium-size town is usually not limited to the size of the population since there has not been a real cut-off point and in many cases depending on the regional context. For example, the European small and medium-size is 5,000 to 20,000 (van Leeuwena and Rietvelda, 2011). In addition, all of the case study towns needed to have a riverside location of the town centre, as this is commonly found in many town settlements of Southeast Asia, and no outstanding features such as tourist attractions, historic sites or ports and other logistic hubs. The reason behind these criteria was to control for other intervening factors that could influence urban expansion, such as large investment by central government to promote particular areas. For example, the announced plan to build a new road linking Dawei Port Project in Myanmar strongly influenced land speculation in Kanchanaburi– a border town in Thailand. Even though the project has been suspended, land prices and purchases along the proposed route increased dramatically (e.g. Chachavalpongpun, 2012; WordPress, 2013). The cases needed also a mixture of economic activities typical provincial towns which were retailing, agriculture and factory/industry.

Using these criteria, six provincial towns located in the central region of the country were initially selected as potential case study towns, namely Singburi Province, Nakhon Nayok Province, Prachinburi Province, Ang Thong Province, Saraburi Province and Chachoengsao Province. Three of them were considered to be unsuitable due to some specific/intervening characteristics that were identified during a site visit in 2010. For example, large-scale military base camps in some town centres were generally inaccessible both in terms of secondary data and physical access; whereas some other town centres were too large in scale when compared to others. Consequently, three provincial towns were chosen as cases for the case study. They were Nakhon Nayok

Province (NAK), Ang Thong Province (ANG) and Chachoengsao Province (CHA). These three sites were representative of the mixed economy of typical provincial towns, which were retailing (Nakhon Nayok Province), agriculture (Ang Thong Province) and industry/factories (Chachoengsao Province) as shown in recent records to be providing major revenue for the provinces (further detail in Chapter 4).

DATA COLLECTION

Linking to the conceptual framework of this research (Figure 3.1), the data collection consisted of two data sets, which were 1) spatial configuration and urban structure and 2) spatial political economy. Each one included primary and secondary data as shown in Figure 3.2. A primary data set of both spatial configuration and political economy derived from the three surveys during 1) a site visit in 2010 to observe the overall urban expansion phenomena 2) fieldwork observations in the middle of 2011of the existing condition of the physical environment, an observation of traffic survey and a questionnaire on retail behavioural patterns and 3) post observation in early 2013 to capture the most recent changes. The secondary data set consisted of general and periodic data of urban development planning and policy, and series of maps and aerial photographs mainly for providing space syntax base maps.

Primary Data Set

There were two main types of primary data: 1) observational surveys for three different purposes; and 2) questionnaire surveys of customers.

Observations

There were three types of observation used in this research. Firstly the site visit aimed to select the representative sites for this case study of Thai provincial towns. From the case study criteria, six potential areas were chosen at the beginning and visited in 2010. During the pilot phase many important secondary data sources were unavailable, such as periodic land use and infrastructure maps from the 1960s, despite being requested at both the local and central offices of town planning. In some of these areas the data had been discarded as there was no archiving. Eventually, three cases were chosen which had more secondary data; they were Nakhon Nayok Province (NAK), Ang Thong Province (ANG) and Chachoengsao Province (CHA) (further details in the preceding section on CASE STUDY SELECTION AND CRITERIA).

Considering the information from the site visits, the shared characteristics of the retail area among case studies are divided into three time periods (Further detail in Chapter 4: THE PERIOD OF RETAIL AREA DEVELOPMENT IN PROVINCIAL THAI TOWNS). The first period is typically a riverside small-size retail area, with single-storey buildings or vacant space surrounded by old-style shophouses. More recently, such retail areas are mostly abandoned, and the area has generally become deteriorated. In the second period, the main retail area is surrounded by newer shophouses, mostly expanded from the first-period retail area, and situated near the first central bus station. This is a typical pattern of development of main retail areas in Thailand, which could be called a ‘Popular Market’ (or Regular Market called *Talaad Samai Niyom*) (Faculty of Architecture and Urban Planning, 2008). Such main wet market buildings are more recently partially-used, redeveloped, or abandoned depending on the context of different towns. The third period is the new development retail area, with shophouses typically

emerged on the new roads and/or surrounding the out-of-town central bus station. The strip of modern commercial buildings is usually located on the roadside of avenue or highway leading to the suburban areas. In some cases, the large-size and multi-purpose vacant space may be used as a temporal market on weekends and as car parking on weekdays.

Secondly, fieldwork observation was systematically designed to generate data that could show urban growth and the parts of cities that were in decline or flourishing especially in the market and retail areas. It also aimed to transform the qualitative form of socio-economic data, e.g. quality of public space, urban decay, into quantitative assets that could be statistically analysed with the spatial properties from space syntax software. There were two parts in the fieldwork: 1) the urban survey of existing physical environmental conditions and 2) the observation survey of traffic and retail behaviour.

i. Urban survey of existing physical environmental condition

This survey recorded the conditions of the physical environment. This included information on land use (i.e. road network, land use pattern), locations and characteristics of recent and ongoing large development projects in the municipal areas (i.e. department stores or shopping centres, housing estates, gated communities, industrial estates) and environmental surveys of main retail areas and retail patterns (i.e. number and characteristics of local and modern retail trade, category of shop, building use, number of closed shop). In brief, three main retail areas in accordance with the chronological divisions of each province were studied in detail. The survey used large-scale maps and cameras to record the urban development and tagged photographs to record physical characteristics. Photographs were mainly taken of buildings, spaces, and activities and tagged to the location of the activity or building. The different types of

shops were divided according to type of products and services, which can be classified into 15 categories; 1) Fresh produce without services, 2) Eating and entertainment with service, 3) Grocery, 4) Clothes, fashion, accessories, shoes shop, 5) Health and beauty, 6) Goldsmith, jewellery, watch and optical, 7) Baby and toy shop, 8) Electricals and vehicles shop, 9) Education, book store, 10) Home and decoration, 11) Agricultural and occupational equipment, 12) Bank and private services, 13) Public utility and non-profit organisation, 14) Religion and belief, and 15) Mixed types, e.g. shops that mix more than one type of products and services.

ii. Observation survey of traffic and retail behavioural patterns

Traffic movement and retail behaviour data were recorded systematically as: 1) traffic and pedestrian movement in the main retail areas and 2) static economic and social interaction in the main public spaces. Due to data recording at multiple spots at the same time, this part of observation required the employment of four additional assistants to record the data.

Traffic quantity data was recorded at the set up gates, in which the observers could count the people at the same spot (i.e. observation pole) at the designated times. In each case study, the researcher marked out between 30 to 50 gates around the main retail area and wet market building (see gate position of each case study in Appendix A). Gate counts (see traffic record form in Appendix B) were carried out at regular intervals to record the pattern of movement including type/mode of transport (Dalton, 1997), and particularly at peak hours, five times a day (i.e. morning rush-hour at 7:00-8:00, mid-morning period at 10:00-11:00, lunch-time peak at 12:00-13:00, mid-afternoon period at 14:00-15:00, and evening rush-hour at 17:00-18:00). Movement data in addition to

traffic volume included the type of pedestrian (i.e. children, adults, and elderly) or vehicle (i.e. bicycle, motorcycle, personal car, public bus, and service vehicle). Each gate count was processed for a period of three minutes representatively on one weekday and one weekend due to the limitations of budget and time in this research. The fieldwork observation avoided festive holidays or special occasions. Using a large-scale map, static social and economic interaction in urban public space was recorded. This record characterised the pattern of activities that took place in the public spaces, particularly retail areas, such as waiting areas surrounding the wet market buildings, the main entrance of modern trade retail units, and waterfront public spaces. The snapshots of socio-economic interaction were recorded five times a day during the gate observation. The data was collated to calculate the average traffic volume, characteristics of users, use of space and patterns of activities in public space.

Thirdly, post observation was conducted in the early of 2013 aiming to capture the most recent changes in the study sites. The reason behind the post observation was that several important projects had been continuing during the fieldwork observation in the middle of 2011. The completion of these projects influenced retail activity in the three towns which was captured by observation during this visit.

Questionnaire Survey

From previous research experience, the researcher knew that cooperation would not be a problem, but the reliability of answers might be an issue, especially if the participants would prefer not to give information about their income and spending. The questionnaire therefore aimed to use simple questions, in which the wording was flexible for use with different groups of participants. However, the behavioural

observation would help balance the overall gathered data from the participants and support the reliability of analysis.

A short questionnaire (see Appendix C) consisting of 12 questions was used to conduct a randomly sampled survey of shoppers in each of the three selected shopping areas in each case study town. A sample group of 150 was expected for the survey in each case study town (i.e. 50 responses per retail area); and the total number of responses was 446 from the three provincial towns. The series of questions were designed to obtain information on the number of visits per week, retention time, and average spending per visit, products most frequently bought, and reasons for choosing the retail/market for shopping. It included some general socio-economic and spatial-behaviour questions (i.e. gender, occupation, distance from residence to retail area and mode of transport) to enable triangulation of data analysis with the spatial and physical development. The pilot survey among Thai students in the UK showed that it would take around 5-10 minutes to complete a questionnaire.

For the questionnaire surveys, the team briefly introduced themselves as well as the aims of the survey and research to the participants The participants were given a participant information sheet with further details of the research and informed consent was requested. If the participants agreed to answer the short questions, the interviewers would record the answers on the questionnaire form. During the survey, if any participants did not wish to continue with the questions, they were free to do so and incomplete surveys would be discarded appropriately in front of them.

Secondary Data Set

The secondary data contained three types of information: Maps for spatial configuration analysis, social and economic background, and urban planning policy (further detail in

Chapter 4: Setting). The first type included maps for spatial configuration analysis, i.e. GIS database, series of maps (cartography, land use map and aerial photographs). The study of urban development in this research was focused from the 1960s onwards. However, both land use maps and geographical maps of the period were scarcely available, and therefore this research instead used both military aerial photographs from the 1970s (i.e. the oldest aerial photographs available) onwards and Google Earth Satellite images of the present (2011) to collaborate with the data analysis of land use maps from the end of 1960s. Nevertheless it should be noted that the maps and aerial photographs for some years were unavailable, and thus the Nakhon Nayok only used maps or aerial photographs from 1973, 1997 and 2011. For Ang Thong, the maps from 1973, 1993 and 2011 were used. The maps for Chachoengsao were available from 1973, 1990 and 2011.

The second and third types were respectively the information on social and political economic background and urban planning policy. They were selectively collected from retail business censuses, retail trade reports of Thailand, newspaper cuttings, along with urban planning regulations, comprehensive planning reports, traffic and transportation reports, and social and economic development plans since the 1960s. In addition demographic and socio-economic data on income, education, occupation, type of residence, distance from residence to town retail centre and mode of transport were used as indicators of socio-economic differences. There were limitations in the secondary data in relation to the development policies, population, and socio-economic differences owing to the reporting system of the census data, which was focused at the provincial level or a number of municipalities. Another aspect was the spatial insensitivity of the data, when considering the local context of urban development, for example. In many

areas the new development was linear and by roadsides, and the data provided at the provincial or municipal administrative scale were inadequate concerning the socio-economic situation of particular urban areas. The limitations of the secondary data were partially addressed by using observation and questionnaire data as explained in the previous section.

Sampling Method and Size of Sampling

Population

The inclusion criteria for the questionnaire survey were that participants were adults, able to spend independently, aged 18-60 years old and active in the studied area by either walking or using vehicles (i.e. bicycle, motorcycle, personal car, public bus, service vehicle). The studied areas focused on the towns' commercial centres, within the municipal boundaries. The characteristics of the retail area(s) were divided into three periods. The first-period retail area was a riverside with a small-size wet market building. In the second-period retail area, the main area of wet market building was surrounded by newer shophouses, mostly expanded from the first-period retail area and situated near the first central bus station. The last period was the new development retail area, in which shophouses normally emerged on the roadside particularly on the bypass and highway, close to the out-of-town central bus station.

DATA ANALYSIS

The data analysis from both main data sets of spatial configuration and political economy, and also primary and secondary data, consisted of three stages which were desk-based, statistical and explanatory analysis. Desk-based analysis consisted of three categories. First, physical urban change and other major changes in urban spatial

structure were analysed by historical aerial photographs and land use maps, approximately taken from the 1960s to present, by which the most up-to-date maps were adapted from Google Earth's aerial photographs. The periodic aerial photographs were also purchased from the Military Cartography Section of the Royal Thai Government. The GIS digital maps and a series of land use maps were obtained from the Town Planning Department. Then, the researcher traced back the sequence of town development by mapping the secondary data and using observation data from fieldwork.

Some other important data were the years of construction/demolition or other significant changes of retail areas and groups of commercial buildings/shophouses, the construction of modern trade/shopping centres, major road construction, as well as fire incidents or the adaptation of commercial buildings. The secondary data came from various sources including general information from provincial archive/official website of provinces, provincial commerce report and from the Highway Department. Finally, accessibility was examined by using spatial analysis – Depthmap software from space syntax. One of the research objectives aims to measure the level of accessibility by considering the Integration degree, as detailed in the research tools section.

Statistical analysis was applied to study the relationships between observation data and spatial configuration data, by using SPSS software, such as the correlation between spatial properties from space syntax and retail behaviour pattern and traffic data variables. Descriptive analysis was applied to initially show the frequency of questionnaire answers.

Research Tools

There were three main research tools in this research: spatial configuration analysis by applying Depthmap from space syntax and GIS-MapInfo; map update by using Google Earth, AutoCAD and Illustrator; and statistical analysis by using SPSS.

A major tool of this research was the spatial configuration analysis from space syntax software – Depthmap (Turner, 2004), which is a useful tool, particularly for architecture and urban design studies, for predicting future land usage by considering the changing pattern of movement and area network or searching for a pattern of settlement in the past (see further details from Spatial Configuration Analysis and Measurement in Chapter 2).

Spatial configuration analysis using space syntax consisted of two parts that were the analysis of public area network by computer simulation and data collection of area usage by empirical study. The software is usually applied for the general tasks of urban planning analysis, by calculating the average depth of all public area units of the network and representing them as colours from blue to red, called Integration, and showing degrees of accessibility from low to high levels respectively. It shows paths according to the level of accessibility in terms of encouraged through-movement, as well as associated urban activities – from a low to high degree respectively. The software has been developed to link with other analysis programs such as GIS. The space syntax software version chosen at the start of this research is called Confeego.

However, at many stages and for a considerable period of time there were technical problems with Confeego. The beginning of a series of troubles came when the new version of Confeego finally replaced the old version that was often reported to have various problems. Nevertheless the new one was a trial version that repeatedly required

new registration licence numbers, for which the researcher had to contact the software developer very often and was still unable to resolve the errors. After struggling for over two months, the researcher, with collective suggestions from technical experts, decided to use Depthmap instead of Confeego and restarted the entire data processing stage. Depthmap shares the same principles as Confeego, but with less problems/errors in analysis. However, Depthmap can neither be automatically transferred nor directly analysed with GIS, and thus the researcher chose to do the statistical analysis using SPSS to manually complete the process.

There were several other forms of graphic user interface software that were used as supportive tools for updating the data or for the adaptation of data presentation. These were: 1) AutoCAD which was used to draw the updated and scale-corrected versions of maps taken from GIS-MapInfo; 2) Google Earth which provided the latest aerial photographs as well as the measurements of distance and size of the areas; 3) Illustrator which assisted the physical transformation analysis, map analysis and graphical presentation, such as the layering of data for some specific analyses; and 4) Statistical analysis software using SPSS to analyse the statistical relationships between variables from observation and questionnaire data, using frequency of shopping behaviours, correlation and regression analysis.

INDICATOR SUMMARY

Considering to the conceptual framework of this research, the methodology was developed by the two main research approaches using a case study method with multiple cases with pattern-matching techniques. This research employed spatial configuration analysis as its main tool, including spatial political economy data for

explanatory normalisation among the cases at the end of analysis. The research methodology was designed to structurally interpret and systematically analyse the socio-spatial changes of the urban retail development process in medium size Thai towns in a global South context. The indicators, sources of data and scale of indicators are summarised by each research question as shown below:

Table 3.1 Summary of Indicators

Question 1: The process of retail area development change over the last 50 years					
Spatial Configuration			**Spatial Political Economy**		
What is measured?	**Indicator**	**Source**	**What is measured?**	**Indicator**	**Source**
• Physical change of town centre over 50 years (of district)			• Spatial political economy in the process of urban development (of district and national)		
i. Expansion of the urban area ii. Road network analysis iii. Changes in urban land use	-Location Size and boundary, settlement pattern, built-up area -Road networks -Urban land use	- Series of maps, i.e. GIS base map, aerial photography and land use map dated back approximately 50 years, Google map - Traffic and transportation reports - Land use map and guideline, observation of urban land use	i. Urban development practice and policy ii. Road network development iii. Urban expansion and change in urban land use	-Large scale urban projects, urban development policy, development of town centre -Road networks -Land use patterns	- Observation of urban land use, urban planning regulation and comprehensive planning reports, social and economic development plans - Traffic and transportation reports - Land use map and guideline, observation of urban land use
• Spatial structure over 50 years (of district)					
i. accessibility and urban space quality ii. town centrality	Spatial properties from space syntax, i.e. Integration, intelligibility, synergy, r3	- Series of axial map from Depthmap software based on series of maps in the period of 50 years			

Question 2: Characteristics of urban expansion in relation to retail areas and spatial segregation in provincial towns					
Spatial Configuration			**Spatial Political Economy**		
What is measured?	**Indicator**	**Source**	**What is measured?**	**Indicator**	**Source**
• Physical urban expansion (of district and its 10 kilometres boundary)			• Spatial segregation in relation to social dimension in provincial towns (of district, its 10 kilometres boundary, and national)		
i. Agglomeration and continuity ii. Variety iii. Density	-Size and location -Categories of urban land use -Degrees of public-private usage -OSR -Built-up area -Settlement pattern	- Recent GIS base maps and aerial photographs - Google maps - Urban land use map and guideline - Observation of existing condition and urban land use	Socio-spatial and political economic dimensions in urban land use	- Categories of urban land use and types of trade, degrees of public-private usage, scale of project (e.g. gated community projects, self-contained urban projects) - Conflicts in society/business - Political economic context of Thai towns	- Observation on urban land use, public space and building use, land ownership - Newspapers, site visit, fieldwork observation - Secondary data/literature on urban development policy and practice
• Spatial configuration (of district and its 10 kilometres boundary)					
	Spatial properties from space syntax, i.e. Integrations, intelligibility, synergy, r2, r3, connectivity	- Axial map based on recent urban development			
• Spatial segregation in provincial towns (of district and its 10 kilometres boundary)					
	- Depth value, and spatial properties from space syntax - Difference between OSR and compactness	- Axial maps and spatial properties - Calculating from axial line number and OSR			

Question 3: The process and trend of socio-spatial development of the main retail areas					
Spatial Configuration			**Spatial Political Economy**		
What is measured?	**Indicator**	**Source**	**What is measured?**	**Indicator**	**Source**
• Physical and characteristics of retail area development (of retail area within municipality)			• Life cycle of retail area development (of retail area within municipality and national)		
	- Location, size and boundary, settlement pattern of each retail area -Retail patterns (i.e. Types of trade, building use and shop category, building condition)	- Series of recent and old maps - Land use maps - Observations of the built environment and retail patterns	i. Success and decline of town centre ii. Trends of urban development iii. Social, political, economic aspects relating to the process of urban development	- Spatial centrality or integration core - Level of accessibility - Type, location, number of redevelopment project, number and location of modern trade development, unoccupied building - Supporting evidence, e.g. locality, tourism policy, social conflicts, inequality and urban justice problems	- Axial maps and spatial properties - Observations of the built environment and retail patterns - Post observation of the continuing urban regeneration and modern trade projects - Newspapers and relevant literature - Urban planning /regulation and comprehensive planning reports, social and economic development plans
• Spatial configuration patterns of retail area (of retail area within municipality)					
	Spatial properties from space syntax, i.e. Integrations, intelligibility, synergy, r2, r3, connectivity	- Series of axial map from Depthmap software based on series of maps in the period of 50 years			
Question 4: The differences characteristics of retail patterns among retail areas					
Spatial Configuration			**Spatial Political Economy**		
What is measured?	**Indicator**	**Source**	**What is measured?**	**Indicator**	**Source**
• Retail patterns and consumer behaviour (of retail area within municipality)			• Socio-spatial and political economic dimensions in provincial town retail development (of retail area within municipality and national)		
	- Retail patterns (i.e. types of products and services being sold, frequency of shopping and average spending per week, reasons for shopping, time spent,	- Urban survey of existing physical environmental condition - Observation survey of traffic and retail behavioural patterns - Questionnaire	i. Movement patterns and socio-economic interaction in retail public spaces ii. Characteristics of transport in provincial town centres iii. Differences	Relations among **- Spatial** (i.e. spatial configuration and physical variables) **and** **- Socio-economic** variables (i.e. traffic movement, socio-economic	- Axial maps and spatial properties - Traffic and transportation reports - Planning policy, regulation and comprehensive planning reports - Urban survey

	travel mode and distance from home to the market or retail area) - Movement patterns (pedestrians, vehicles) - Interactions in the main public spaces	survey	in socio-economic status iv. Spatial segregation and inequality and urban justice problems	interaction, socio-economic status, conflicts in urban space use, space of consumption, control and surveillance in public space (e.g. fencing, gated community, high security) - Supporting evidence, e.g. social conflicts in urban land usage/business, retailers' protest on discount store, slum clearance and local planning practice	of existing condition, building and land use - Observation survey of traffic, social interaction in public space - Questionnaire survey of retail behavioural patterns - Newspapers and relevant literature

Summary and Conclusion

This chapter 3 has set out the methodology and methods used in this study to address the research questions. A case study with multiple cases (3) selected according to clear criteria. The data set from each town consists of documentary secondary analysis, spatial configuration analysis, structured observations and questionnaire surveys.
The links between the conceptual framework and the data are set out in this chapter in Figure 3.2 and the indicators set out in Table 3.1.

The next chapter will be Chapter 4 which will describe the setting and context of the study.

CHAPTER 4

SETTING

INTRODUCTION

In this Chapter on the setting of the research study, the beginning of the chapter sets out the background of political, economic and urban development policies in provincial Thai towns, with particular relevance for the secondary conceptual framework of the spatial political economy of this research study. There are three sections: 1) the political economic background of Thailand (since the first constitution in 1932), 2) the organisation of local government and local implementation of urban planning in Thailand, and 3) urban redevelopment and regeneration policies for retail centres in Thai towns from the 1960s onwards. These first three sections consider the critical issues of urban development policy under the influence of globalisation in the context of global South, linked to section on globalisation in Chapter 2. The fourth section of the chapter presents the setting of the case study sites linked to the criteria set out in Chapter 3. Then, the periods of retail area development of the case study sites is addressed in accordance with information from site visits. The last section explains the challenges in accessing secondary data of provincial Thai towns.

THE POLITICAL ECONOMIC BACKGROUND OF THAILAND: THE POLITICS OF ECONOMIC POLICY-MAKING

Even though Thailand became a democratic state, changing from an absolute monarchy to a constitutional monarchy in 1932, in reality the country has been ruled by several military governments. Patriotism is often a rationale or rhetoric justifying the direction

of national economic policy. By limiting direct foreign investment, the central government has played an important role in both directing and investing in infrastructure by means of state enterprises. During WWII this happened alongside a number of policies that benefited a few leading and powerful nations such as the USA (sometimes through the World Bank and the UN) which reinstated the education, health care and transport system, as well as telecommunications and the expansion of the automobile industry with support from Japan (see also in Chapter 1) (Baker and Phongpaichit, 2005). However, during these military governments the public development policies have benefited a handful of political players and powerful businessmen as is not uncommon in many states (Thawinphipatkul, 1996; Athiwanichayaphong, 2009).

From the mid-1980s Thailand's economic policy changed from agricultural export-led to export-oriented industrialisation, industrial development was encouraged and supported by migration from rural areas to cities as well as rapid urban expansion. From a neoliberal point of view, the combination of economic policy without consideration of the social context and scale of central government interventions and control led to the economic crisis of 1997 (Krugman, 1998; Phongpaichit and Baker, 1999). According to Athiwanichayaphong (2009) the overall economic development of Thailand has been partial capitalism in both policy and practice, in which a major obstacle to the process has been rooted in feudalism with a patron-client system of favours or patronage politics susceptible to corruption and influence. This also has affected the implementation of policies by development authorities at all levels of central and local government, which has been viewed as top down ineffective, visionless and locally inappropriate

(Usavagovitwong, 2012; Webster, 2002; Damrong Rajanuphap Institute and Provincial Administration Development and Promotion Bureau, 2008).

THE LOCAL PLANNING SYSTEM AND THE ROLE OF LOCAL GOVERNMENT IN THAILAND

Town and Country Planning, or urban planning was part of westernisation in Thailand, and started around 1922 during the reign of King Rama V. This was firstly through the use of European consultants who served in the Royal Court and focused on modern infrastructure planning such as roads and inner district facilities in Bangkok, the capital city, and railways linked to other towns. The general aim was to modernise and beautify cities as well as to promote public health and safety including fire protection and disease prevention in urban areas (Baker and Phongpaichit, 2005). In the beginning, urban planning was only considered and practiced in some specific areas of Bangkok until the first City Planning Act 1975 was fully applied to the whole country. However, the Act was written to meet the policy of economic concentration in a city, including industrial development in specific urban areas such as ports and factories, more than as a guide to control development of the vast rural and agricultural areas which comprised the majority of the country, and thus generated big differences in overall development between town and countryside (Parnwell, 1992; Thawinphipatkul, 1996).

There are six levels of land use planning within Thailand each with their own plans. These are plans for: 1) the region (i.e. group of provinces), 2) the provincial structure, 3) urban municipal area, 4) the comprehensive urban area, 5) the local specific area, and 6) the district. The Town and Country Planning Authority, as part of the Department of Public Works and Town and Country Planning within the Ministry of Interior, is

currently responsible for making all of these plans. It should be noted that administrative organisations in Thailand have hierarchical structures which are geographically divided into five Regions (mainly used for generating economic development policies), with as of 2013, 77 Provinces (Changwat), 878 Districts (Amphoe), 7,255 Sub-districts (Tambon), and 74,944 Villages (Muban) respectively. Generally, administrative units of each province have been under two systems, 1) Units of central government consisting of a Provincial Administration, District Administrations/Semi-district Administration(s); and 2) Local government including a Provincial Administrative Organisation (PAO), (Mueang/Tambon) Municipalities, and Tambon Administrative Organisations (TAO). Although there are many different levels of land use planning in Thailand, the urban planning system has been critiqued as having barely effective legal guidance, particularly those in provincial towns which are provided with general sets of regulations and policies such as 'zoning' (Office of Urban Development, 1994a). For example, the City Planning Act 1975 and the amended version in 1992 focused on the general aesthetic maintenance of urban landscape and natural resources. Likewise, the Building Control Act 1979 is only concerned with negative impacts on buildings and townscapes; whereas other laws are too specific on issues, such as National Tidiness and Orderliness Act 1992 and Cemeteries and Crematoria Act 1985.

The planning system has also been critiqued by Thai scholars (e.g. Pattana-Anak, 2000; Usavagovitwong, 2012) for being outdated and ineffective, catching up with neither the local nor global context. Decisions on the issues that are not stated in these laws, which are not easily adjustable to rapid urban expansion, must be made by the central government, improved by the Building Control Committee and authorised by the

Ministry of the Interior (Office of Urban Development, 1994b). It tends to discourage integration with other state agencies and encourage only a top-down strategy without consideration of the different contexts of each area. In addition, there is a lack of expertise among planning personnel (Glassman and Sneddon, 2003; Damrong Rajanuphap Institute and Provincial Administration Development and Promotion Bureau, 2008; Usavagovitwong, 2012).

Planning at the local government level including PAO, Municipalities, and TAO, has been supported by the provision of provincial urban planning offices in every province since 1994, following the national social and economic plans which stressed the urban-rural economic disparity and decentralisation (i.e. to rural areas outside Bangkok). However, the practice of requiring the Head of each Provincial Office to attend the Central Office to receive monthly central policy briefings without discussion of provincial issues is an example of the centralisation of planning policy and its implementation. Furthermore, several levels of the planning system are not efficient in terms of implementation. For instance, the urban sanitary plan does not have any supporting laws for enforcement; and the provincial structure plan does not have supporting budgets for implementation, because other state agencies (and its provincial offices) already have their own plans with budgets to fulfill their own objectives. Another example is the local specific plan, in which the law encourages local governments to execute their own planning process but without the support of planners, relevant documentation or data gathering at the local level. The enforcement of the local specific plan is another issue, because it needs approval from the Cabinet and a complicated process at the central government level (Pattana-Anak, 2000). Local

government thus lacks legal and practice codes for successful implementation of contextual planning at the local level.

At this point, a conclusion can be made that the urban development process at local level in Thailand has not been able to engage local authorities and local people to take part in it. The modern planning policy as a set of standards from central government currently has very little concern for local realities and contexts. In addition, its 'static' and 'out-of-date' policy has failed to implement dynamic and complex urban changes in of Thailand. For these reasons, demonstrations and protests have often occurred concerning the land use and other social conflicts, such as protests against modern traders in the inner city areas or other inappropriate investments in historic/natural areas which reflect the lack of actual public participation and local input in the planning system (Pattana-Anak, 2000).

URBAN REDEVELOPMENT OF THAI TOWNS AND REGENERATION POLICIES FOR RETAIL CENTRES

Tourism is also relevant to urban development and planning. Aspects of urban development linked to tourism policy in Thailand can be traced back to the establishment of the Tourism Authority of Thailand (or then Tourism Promotion Organisation) with the support of the World Bank and UN during the first national economic plan in the 1960s. The objective was to utilise the natural and cultural resources to generate income from international visitors, and the focus on conservation and cultural tourism has continued in Thailand since then, such as in the Historic City of Ayutthaya and Historic Town of Sukhothai and Associated Historic Towns – all designated as historical parks and then UNESCO World Heritage Sites in 1991. This

has led to urban regeneration/redevelopment in many old towns and historic areas across the country, with the purpose of tourism as a driving force. For example, the architectural conservation project and cultural tourism promotion of the river-based settlement in Amphawa, beginning in 2001, was through cooperation between an academic institution, a Foundation under royal patronage, a foreign fund, the Municipality of Amphawa, and the Office of Natural Resources and Environment (Techaratpong, 2014). Other examples are the urban conservation of shophouse communities and the establishment of the annual celebration of Phuket Old Town since the late 1990s (ScholarSpace, 2007).

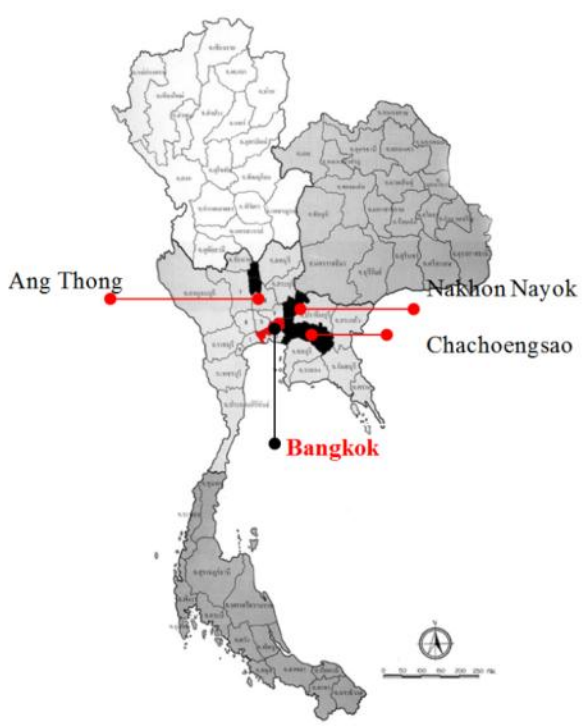
In terms of urban development policies in retail centres, as mentioned in the previous section, the existing planning regulation for urban areas has little emphasis on the specific local context of different retail sites. Any development, dilapidation and re-development was therefore caused by socio-economic changes, including new patterns of inhabitants or customer behaviour, such as river-based markets in the past and temporary markets along the roadside, without appropriate planning and effective control from central government. Land use in prime areas has often been developed amidst conflicting interests and high economic competition. Evidence of this can be seen from informal settlements and low-income housing clearances or relocation and land ownership conflicts with state agencies and major landlords. The competition between local retailers and multinational retailers such as Tesco Lotus, in one of the case study sites, has happened particularly in provincial towns. This has led to a protest requesting that the Retailing Act limits the size and location of multinational retailers (Economic Reporter Thairath, 2012).

Apart from retail district development policy, the measurement and vision of central government housing policy is another aspect related to town centres and is relevant to this thesis. The National Housing Authority (NHA) was first established in 1972, and the programme aimed to provide housing units for low-income inhabitants in urban areas. Most policies by NHA were linked to a slum clearance approach, particularly in the 1950-60s (Usavagovitwong, 2012), which pushed the low-income people to the fringes of towns where there were inadequate infrastructures and social facilities within and around the newly built housing estates. Some examples can be seen from the riverside recreation parks in many provinces, which were mostly redeveloped from former historic settlements including in the three case study sites in this study. These local government projects were either part of central government policy and planning with a budget or were initiated and executed at local level with locally collected revenue, in which case the budget was always much smaller (Reform Thailand. 2011)

Nonetheless, the urban redevelopment policies of Thai towns have been critiqued as lacking transparency, social justice, and good governance, and sometimes benefited local politically powerful elites (Giles, 2003; Usavagovitwong, 2012). Many urban conservation projects were initiated by educational institutions or NGOs rather than by government. In some cases the rehabilitation was for the economic survival of the community by exploiting the locality approach to generate a nostalgic tourism destination which benefited most traders in the settlement. Local governments were later seen trying to support such regeneration programmes for increasing tourism, but the bureaucratic system sometimes limited the cooperation amongst state agencies and with the inhabitants, often through public participation hearings that did not generate any dialogue between the state and its people.

CASE STUDY SITES

Figure 4.1 Locations and provincial maps of case study towns



A: Position in the central region

B: Nakhon Nayok Provincial map

C: Ang Thong Provincial map

D: Chachoengsao Provincial map

Three provincial towns were chosen as case study sites, according to the criteria of selection in the methodology chapter (Chapter 3); they were Nakhon Nayok Province (NAK), Ang Thong Province (ANG) and Chachoengsao Province (CHA). A typical characteristic of the provincial towns in the central region of Thailand (Figure 4.1-A) is the riverside location of the town centre, which is also commonly found in many town settlements of Southeast Asia. As part of the selection criteria, these chosen towns had no speciality or outstanding features such as tourist attractions and historic sites.

Nakhon Nayok Town (NAK)

The Nakhon Nayok Municipality (Figure 4.1-B), consisting of areas partly belonging to several sub-districts of Nakhon Nayok City District, was considered the boundary of a case study town in this research. The province was situated approximately 107 kilometres (km) north-east of Bangkok, covered 2,122 square-kilometres (km^2) (King Mongkut's University of Technology Thonburi, 2003) and had a population of 250,753 in 2008. The Nakhon Nayok Municipality was 15.87 km^2 in area and had a population of 17,143 with a density of 1,080.21 persons per km^2. The major economic activity was related to the wholesale and retail trade (21.51% of GPP) along with some agriculture (19.67% of GPP) and education (9.27% of GPP) (Statistical Forecasting Bureau, 2008).

The town centre of Nakhon Nayok was settled on the bank of Nakhon Nayok River. From site visits in 2010, its urban area expansion was situated along Highway 305 and 33 leading to several important destinations such as higher educational institutions outside the town centre and the capital city, Bangkok. There were two restricted and self-contained urban projects, the Chulachomklao Royal Military Academy, established in 1990 and the newly relocated Armed Forces Academies Preparatory School at the outskirts of Nakhon Nayok Municipality.

Ang Thong Town (ANG)

The Ang Thong Municipality was located on the eastern edge of the province, approximately 105 km north of Bangkok (Figure 4.1-C). The province covered 968 km^2 with a provincial population of 269,419 in 2008 (Department of Economic and Social Affairs of the United Nations Secretariat, 2010). Even though the municipality itself covered 2.9 km^2 which was the smallest case study site of this research, its population of 14,675 gave it the highest population density of 5,060 persons per km^2. An economic report in 2004 recorded that wholesale and retail trade was the main economic activity of the province. However in 2008 it was the agriculture sector that accounted for the highest GPP at 21.84%, followed by wholesale and retail trade at 21.39% and the manufacturing sector at 15.02% of GPP (Statistical Forecasting Bureau, 2008). The location of Ang Thong town centre is along the Chao Praya riverside, as similar to Nakhon Nayok. Recently, a new urban area emerged with a commercial strip extending towards the southern edge of the existing town centre, particularly at the ring road intersection, which links the area to Bangkok and the northern region.

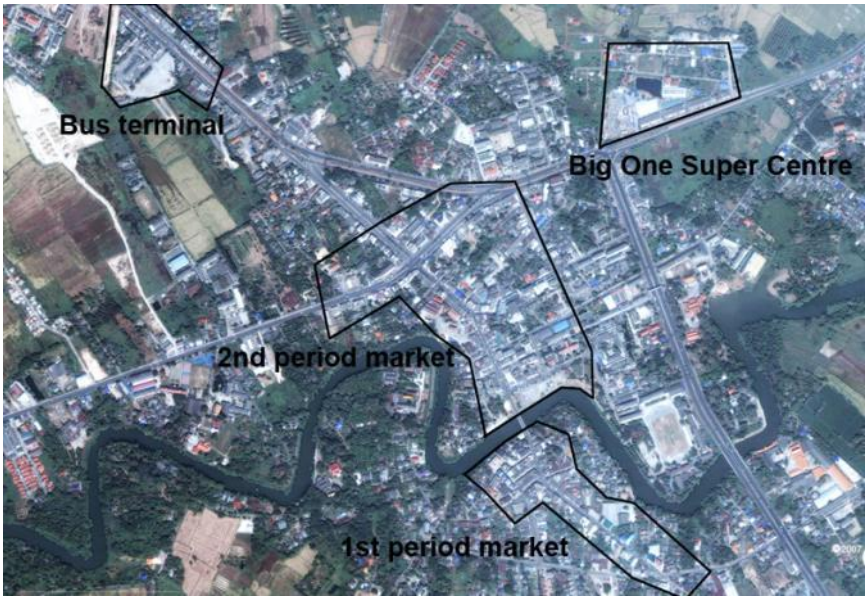
Chachoengsao Town (CHA)

The Chachoengsao Province (Figure 4.1-D) had the highest population of all studied towns at 664,830 in 2008. The municipal population was 39,343 in the area of 12.76 km^2, giving it a population density of 3,083 persons per km^2. Chachoengsao town centre was situated 82 kilometres on the east of Bangkok, on the north bank of Bang Pakong River. The main economic activity of the province had changed from agricultural to industrial sector by the end of 1980s because of the industrial estate relocation policy at the national level, mostly into one district of this province (Suranaree University of Technology, 2004). The manufacturing sector therefore became the major income of the

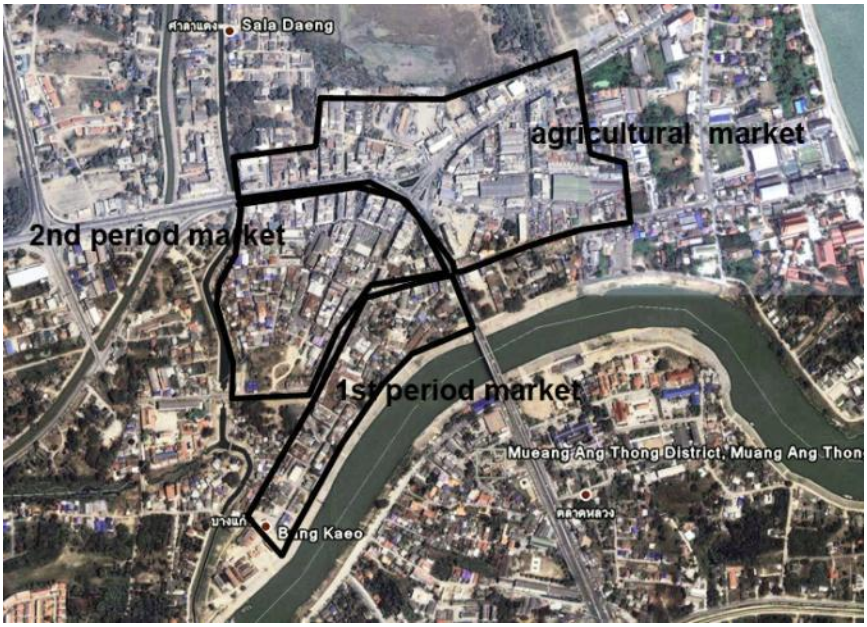
province (76.52% of GPP), followed by wholesale and retail trade (6.08%of GPP) and agriculture sector (5.62% of GPP) in 2008 (Statistical Forecasting Bureau, 2008). The urban area of Chachoengsao town centre expanded along the ring road, particularly on the west side of the existing town centre leading to Bangkok. New commercial development in this area was obviously modern trade such as a transnational shopping centre and entertainment centre.

THE PERIOD OF RETAIL AREA DEVELOPMENT IN PROVINCIAL THAI TOWNS

Figure 4.2 Retail locations by periods of development



A: Nakorn Nayok



B: Ang Thong

C: Chachoengsao

Source: base maps adapted from aerial photographs from GoogleEarth (2011)

After collecting the secondary data, the researcher surveyed the potential case study towns in 2010. The site visit and pre-observation clearly identified three distinct periods of retail area development (Figure 4.2) when considering the physical built-environment

condition and architectural style, location, wet market building style and condition – in which this research considers the wet market as the focal point of the retail area, including style of shophouse and type of trade (i.e. traditional or local trade retail, wholesale retail and modern style retail).

The first-period retail area development was characterised by the main market building that was normally situated on the waterfront for logistic convenience and waterway accessibility. The centre of commercial activities of the first-period retail area, originating before the end of the 1960s, still had the dilapidated structures of old wooden markets and ports.

The development of *the second–period retail areas* were characterised by the location of the main retail areas that were normally developed adjacent to the first–period retail areas, such as in Ang Thong and Chachoengsao. However, in Nakhon Nayok the main retail area was moved to the other side of the river. The second-period retail areas were developed during the 1970s-1980s, with large concrete buildings and shophouses that surrounded the main trading space and the (first) central bus station. These were the typical pattern of retail area development found in provincial Thai towns, which could be called the 'Popular Market' (*Talaad Samai Niyom*). In the second-period retail areas, Chachoengsao had four wet market buildings of the same period in close vicinity to one another, Bobua market, First central bus station retail market, new CPB (Crown Property Bureau) market and Tawanok Plaza – the first (and fully air-conditioned) local department store in the province. In the smaller town centres there were fewer market buildings, such as one wet market building in Nakhon Nayok and three in Ang Thong.

The third-period retail area development (or recent period) was characterised by the out-of-town location, situated outside the inner town, which was the location of the

first- and second-period retail areas. It did not have a wet market but instead had modern trade buildings constructed alongside the main road or highway. These buildings varied from small retail units such as supermarkets to large-scale shopping centres. The surrounding commercial buildings or shophouses were generally higher than those in the former periods and their businesses were largely the service type, such as finance and insurance offices and restaurants.

From the data of retail area development in the case study towns, the first and second period retail areas were mostly situated close to each other within walking distance. Even though the first-period retail area of Nakhon Nayok was situated on the other side of the river, it was only about 0.5 km from the second-period retail area. In contrast the modern trade retail area of Chachoengsao was located further away from the older retail areas, on the highways easily accessible by car. In this modern retail area, daily products were mostly available only in convenience stores or air-conditioned supermarkets, or in a food section attached to the shopping centre. It is worthy of note that the absence of a wet market in this retail area might affect customer retail patterns and interactions within the area.

CHALLENGES IN ACCESSING SECONDARY DATA OF PROVINCIAL THAI TOWNS

In Thailand the most accurate census and other statistical social data can only be found at either the national or district level. Initially, this research focused on the town centre which was linked to the densely populated municipal area – which meant the registered urbanised area with also a precise administrative boundary. However, the locations of new developments, particularly out-of-town, were not normally correlated with the

existing administrative boundary and therefore the available secondary data that strictly referred to information recorded within the administrative boundary could not be relied upon. For example, the provided data set from statistical records related to the administrative organisations (or *Tambon*), but some parts of these Tambons were the actual urban areas of which this research focuses on.

Hence the statistical data at the sub-district (Tambon) level was only partially useful for the studied areas. Another concern was population data, in which several areas had a number of nonregistered inhabitants, such as the factory workers of many industrial estates in Chachoengsao and university students in Chachoengsao and the Royal Military Academy in Nakhon Nayok. This problem was considered a challenge for the research design and was addressed by a research design using mixed methods which were set out in detail in the preceding Chapter 3.

The following chapters present the findings divided into four chapters linked to the four research questions capturing the changes in Thai provincial towns over a 50-year period. They are the retail area development and structural changes over the last 50 years (Chapter 5), urban expansion and spatial segregation in relation to retail development areas as the impact of urban development in provincial towns (Chapter 6), life cycle of retail areas (Chapter 7) and socio-spatial behavioural patterns in retail areas (Chapter 8).

CHAPTER 5

CHANGES IN URBAN AND SPATIAL CONFIGURATION OVER THE LAST 50 YEARS

INTRODUCTION

This chapter focuses on the analysis of the retail area development process in the case study towns using mixed methods to investigate how the urban spatial configuration, or spatial structure of the town areas as a whole, has changed over the last 50 years. It addresses the first research question of this thesis namely, how has the socio-spatial structure of retail area development in Thai provincial towns changed over the last 50 years?

Three main sets of data were processed and analysed within the conceptual framework to address this first research question (further detail in the summary of indicators in Chapter 3). Firstly, the development of the built environment and urban structure of the case study towns was analysed manually by layering a series of maps including aerial photographs dating back to the early 1970s (Appendix H), as well as studying urban land use from the end of 1960s and the national economic and social development plans from 1961. Secondly, the spatial configuration of each case was computerised to calculate and simulate the urban structure indicators in terms of accessibility (i.e. Global Integration or Rn) and several other spatial properties (i.e. Intelligibility, Synergy, Local Integration or R3), by considering the representative axial maps of space syntax analysis. The results of these two sets of data analysis then helped to link the development of the built environment to its spatial configuration properties that had

changed over time. These results are discussed in relation to the political economy in the fourth section of this chapter.

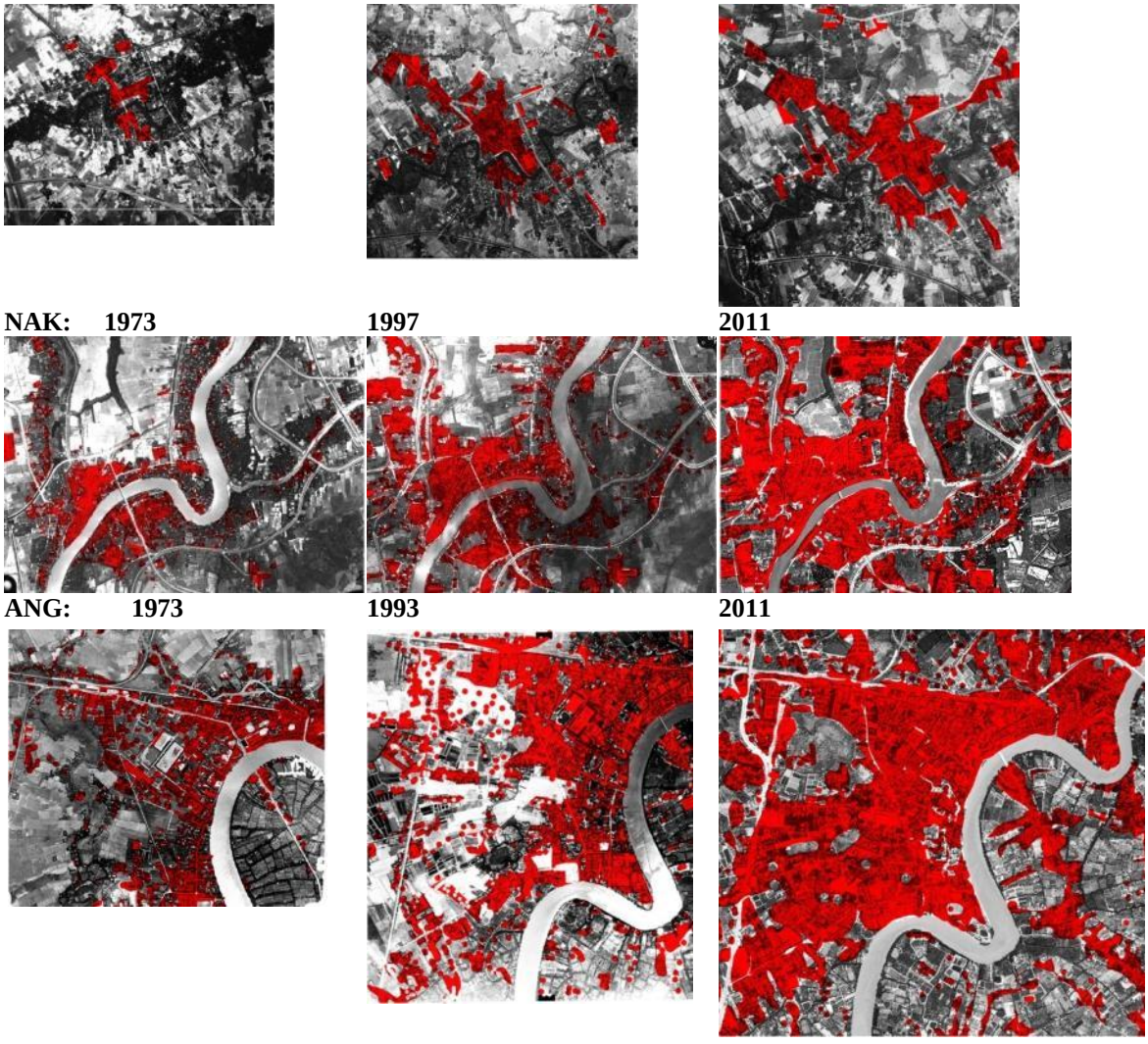
There are five main sections: 1) The development of the built environment and urban structure over 50 years; 2) Spatial configuration of Thai provincial towns over 50 years; 3) The development of provincial town retail areas during the last 50 years; 4) The role of the spatial political economy in the process of urban development; and 5) Discussion of the findings to address the first research question and pinpoint how urban development in the case study towns links to the process of globalisation.

DEVELOPMENT OF THE BUILT ENVIRONMENT AND URBAN STRUCTURE OVER 50 YEARS

To examine the urban structure of the case study towns over the last 50 years, three aspects of development were considered: 1) the expansion of the urban area from 1973 to 2011; 2) the road network from 1973 to 2011; and 3) urban land use at different points in time according to land use maps available, which were Nakhon Nayok 1990, 2000, 2011; Ang Thong 1967, 1976, 2011; and Chachoengsao 1973, 1990, 2011.

Expansion of the Urban Area

Figure 5.1 Series of aerial photo illustrating the expansion of urban area



The Nakhon Nayok's series of aerial photos (Figure 5.1) shows the gradual urban expansion of Nakhon Nayok's district. In 1973, urban areas agglomerated around the bridge, which was the core of the districts on both sides of the river. The built up area of the north side was broader than the southern area, which was densely developed. Twenty years later, the north area had become the main urban area of the district in terms of urban expansion and intensification especially within the main retail area.

There were new development areas dispersed alongside the roads which lead to the capital city of Bangkok. From the latest aerial photo, it can be seen that the urban area gradually continued to grow on the east side, and a new bypass road was built on the north side.

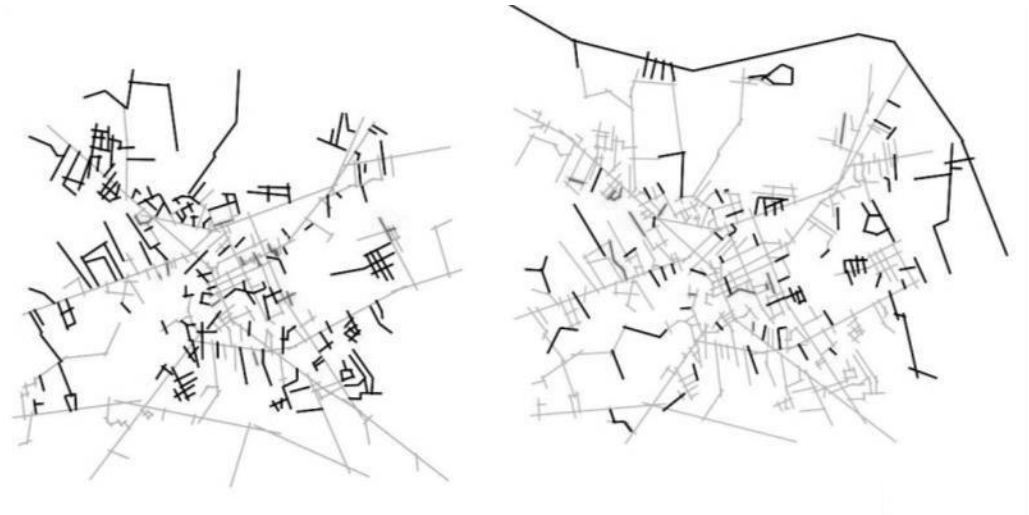
Ang Thong's urban expansion prior to 1973 was set along the river side and included irrigation channels, which distinguished it from the other case study towns and helped to shape its townscape. The urban area expanded to the same degree on both sides of the river. The area of higher density was on the north side, not far from the bridge across the river. The map of 1993 shows new growth on the north bank and particularly on the northwest bank. In 1993 the urban area of Ang Thong town remained at the same location but with more intensive growth.

The urban area of Chachoengsao town in 1973 saw more development on the north of the river than in south. An area of high-density was on the east side of the bridge, which was the location of the main retail area alongside the first railway station. Almost 20 years later, the west side showed more growth than the east side of the town because of the newly-built bypass road in the vicinity. At present the urban area of Chachoengsao has extended densely within the large enclosed urban block. The railroad on the north was a barrier to urban expansion that blocked growth on the opposite side.

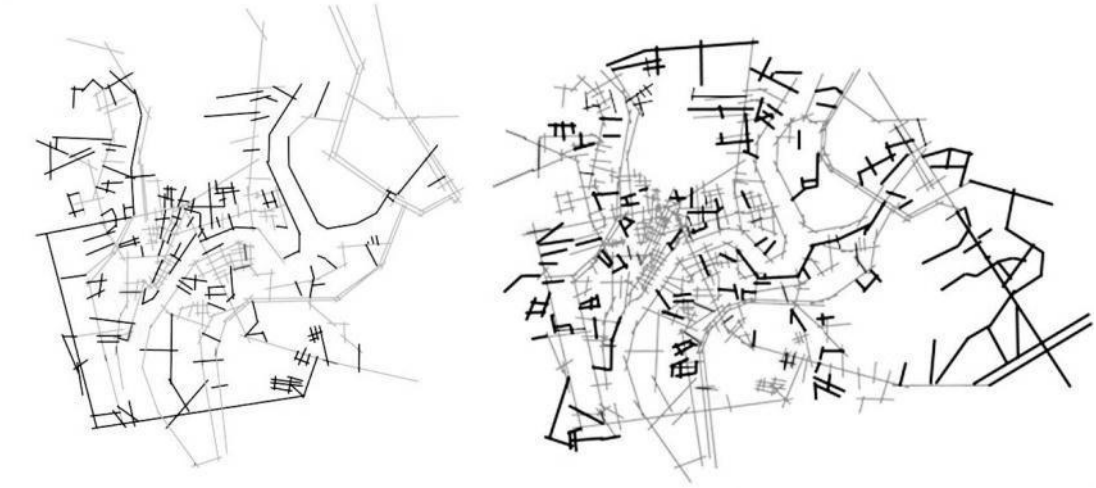
Road Network Analysis

Aerial photos and GIS based maps in Figure 5.2, represent the changes in the road network taking place over 40 years in two main stages: from 1973 to the 1990s and from the 1990s to 2011.

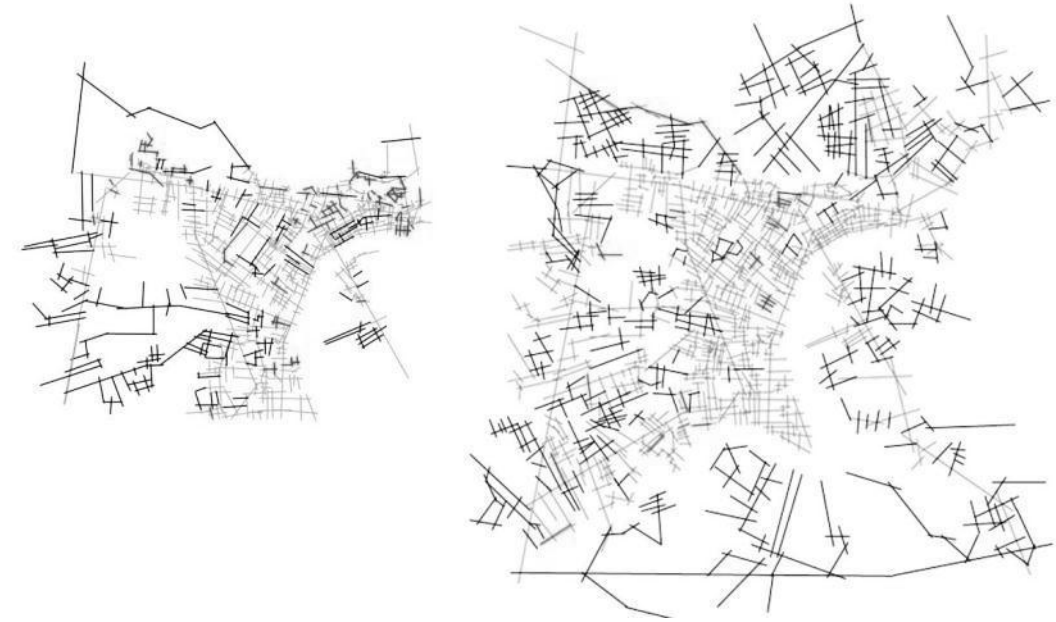
Figure 5.2 Road network developments, in which grey-coloured refers to existing roads, and black refers to new roads



NAK: 1973 to 1997 1997 to 2011



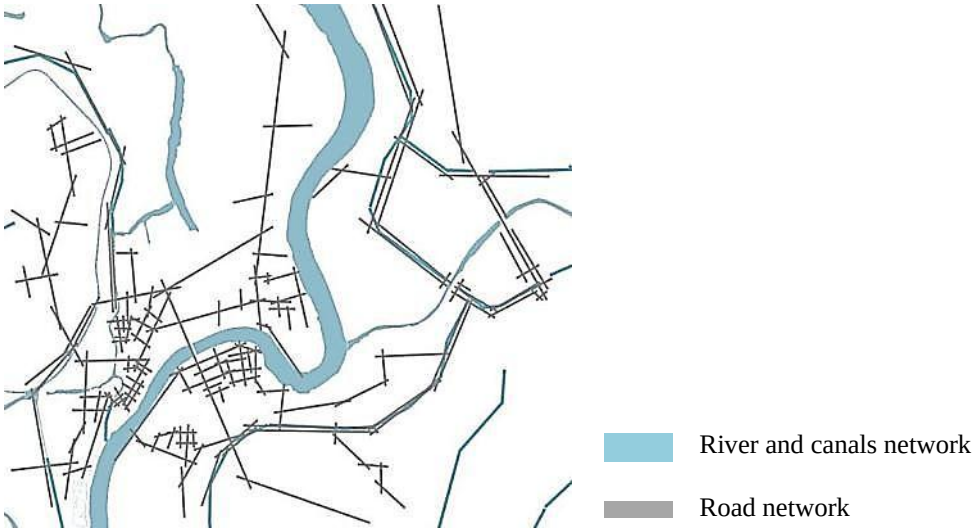
ANG: 1973 to 1993 1993 to 2011



CHA: 1973 to 1990 1990 to 2011

In Nakhon Nayok between 1973 and 1997, a main structure arose from the set of straight long roads linked together in a ‘grid’ pattern. Many short roads were built in this period in order to link with the main roads, which were highways, especially in the northwest area. These highways also linked the district to the capital city and other important places. For example, the Chulachomklao Royal Military Academy was established in 1990 within a distance of ten-kilometres. From 1997 to 2011, a new bypass road was constructed linking the east to the west side in the northern part of the town centre. The main structure appeared to remain the same at this stage of analysis, despite the scio-spatial transformation.

Figure 5.3 Natural barriers influencing the Ang Thong road network prior the 1970s



Ang Thong’s road network, as shown in the location and direction of roads as well as the usage of land, was semi-controlled by natural boundaries, such as the river and its natural tributaries, canal network and irrigation system (Figure 5.3). The first stage (1973 to 1993) of development was a major change, from an organic (natural growth) grid system to a large bypass loop around the existing road network. In the second stage

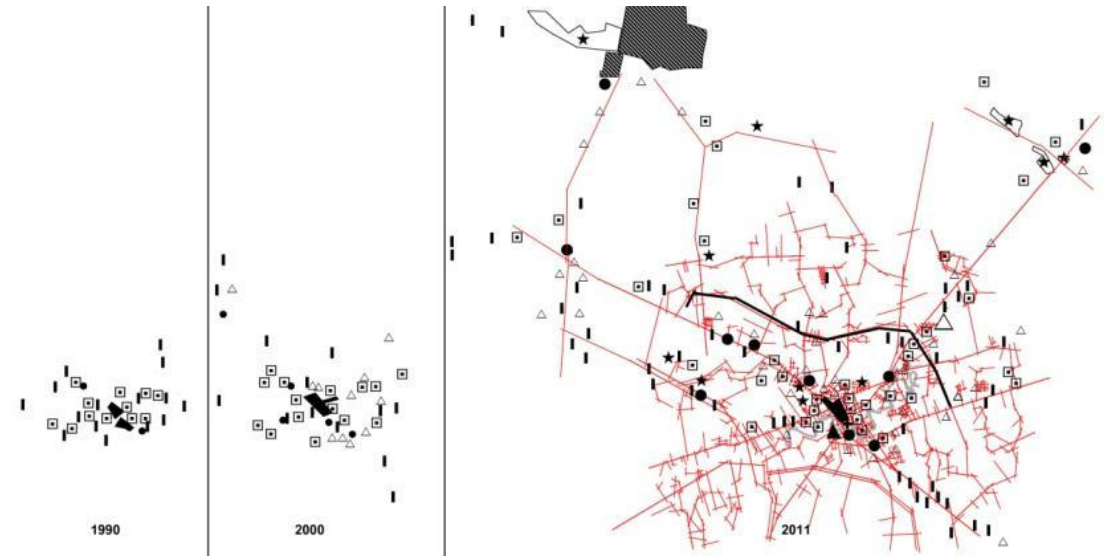
(1993 to 2011), a new ring road was built on the south-eastern side in order to link the bypass loop to the ring road, leading to other provinces including the capital city.

The road network of Chachoengsao town centre changed slightly over time. Some changes were in intensification particularly in the main retail area which is located adjacent to the bridge. Moreover, there were newly built important roads, such as Sri-Sothorn Tat Mai, on the west side of the town centre. Around 1990, the bypass road was built in order to connect the highway to the capital city to the other side of the river, which was preserved as farmland for a long period. In the northern part of the town centre, there have been new development areas beyond the railroad. In this second stage, many short roads are seen spreading all over the district, especially on the west side of the town.

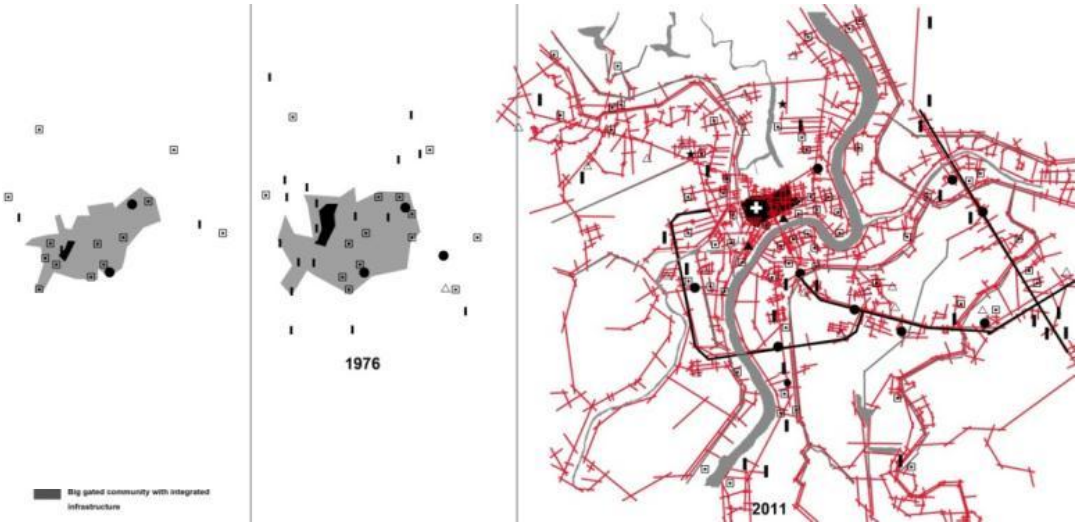
Changes in Urban Land Use

The land use map of Nakhon Nayok from 1990 revealed several urban projects clustering around the core of the town. A decade later, a few small (agricultural-related) factories, public services and housing estates emerged outside the centre. The observation survey of the latest land use showed a number of urban projects scattered at the fringes particularly on the north side of the town centre. Many new commercial strips were located at the road junctions around the town centre.

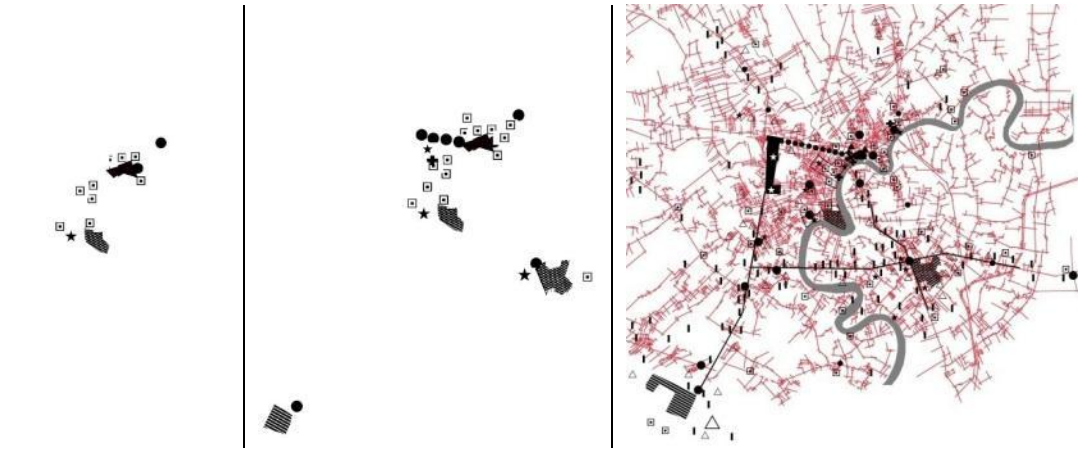
Figure 5.4 Changes of urban land use



NAK: 1990 2000 2011



ANG: 1967 1976 2011



CHA: 1973 1990 2011

The land use maps of Ang Thong from 1967 and 1976 showed the spread of small factories to out of town locations. A few commercial developments also emerged on the west side of the town centre. Later land use in 2011 showed numerous public services scattered outside the town centre. There were many commercial strips on bypass roads and highways and municipal urban projects such as a provincial sports stadium and water amusement park were also built on the fringes of the town centre.

The land use of Chachoengsao from 1973 clearly revealed a cluster of government offices located between the first main retail area and the bridge. Between 1990 and 2011 there was clearly unregulated urban development, without zoning linking to the prior characteristics of town. Several government offices were moved to out of town locations, without links to the previous cluster, whereas small factories were spreading everywhere. Prior to 1990, new buildings with commercial usage extended from the existing retail area, the old core of town, towards the Mahajakkapat Road. Some commercial buildings spread from the Sukprayoon Road south of the town centre towards the military camp. This area has become part of another significant commercial node with a nearby modern shopping centre and small-to-medium shops and businesses, including hotels, in the area. At present several new urban projects are clustered along Highway 304. These were mostly developed after the creation of an out-of-town central bus station around 1993 and include modern style shopping and entertainment centres including cinemas.

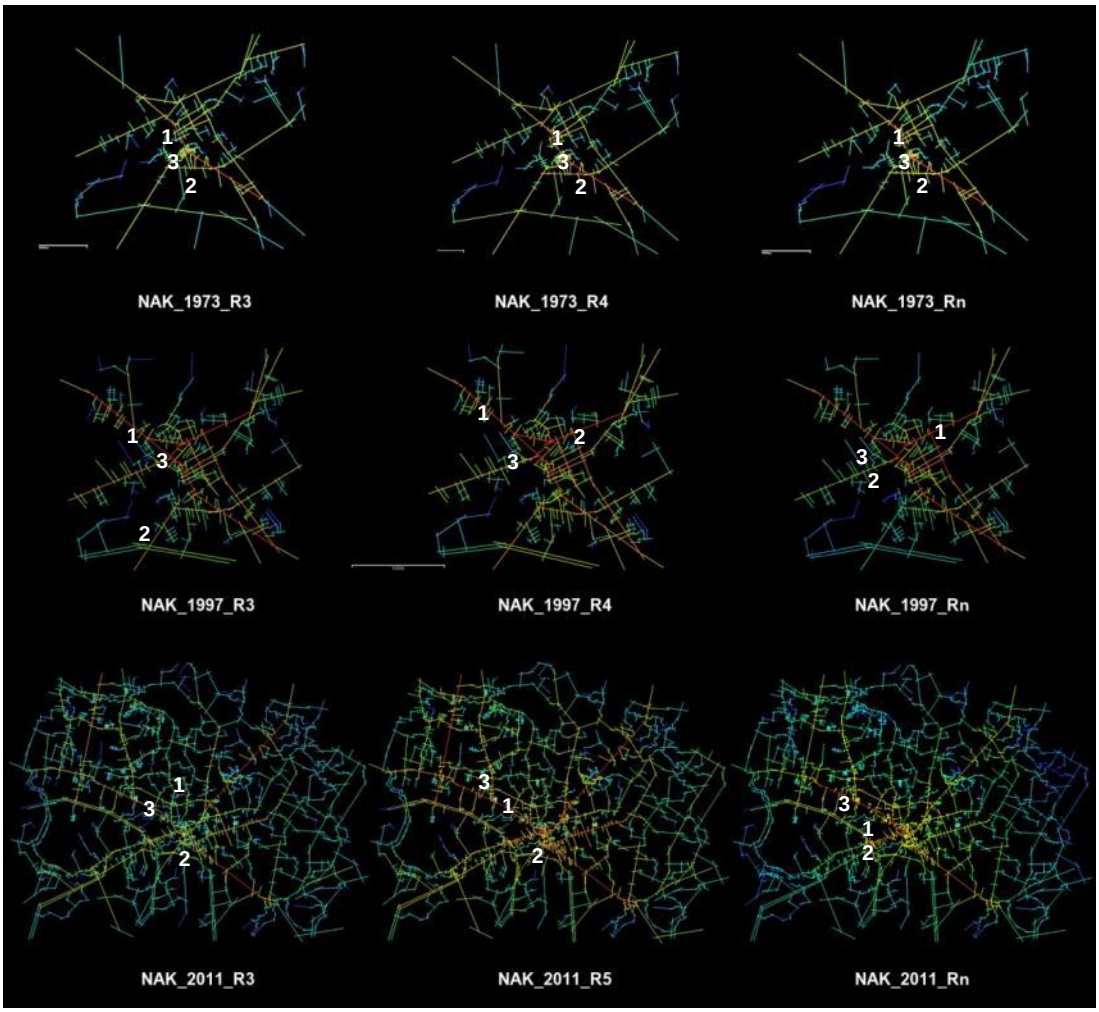
SPATIAL CONFIGURATION OF THAI PROVINCIAL TOWNS OVER 50 YEARS

Spatial Configuration Analysis of Nakhon Nayok

Table 5.1 Spatial properties of each development period and top three accessibility of Nakhon Nayok town

Year/Rank	Local Integration (R3, R-local)		Global Integration (Rn)	Intelligibility	Synergy
1973	1.50351	-	1.02906	0.330351	0.793844
1st	3.24532	R4: 2.68839	1.83065	-	-
2nd	3.21362	R4: 2.59253	1.71583	-	-
3rd	2.82122	R4: 2.3761	1.63106	-	-
1997	1.51729	-	1.06723	0.291832	0.686217
1st	3.2016	R4: 2.58975	1.78609	-	-
2nd	3.01488	R4: 2.53656	1.77227	-	-
3rd	2.97086	R4: 2.44637	1.69836	-	-
2011	1.57829	-	0.89881	0.113916	0.546158
1st	3.68494	R5: 2.2716	1.38459	-	-
2nd	3.51982	R5: 2.26278	1.31029	-	-
3rd	3.4528	R5: 2.22458	1.30043	-	-

Figure 5.5 Nakhon Nayok axial maps of 1973, 1997 and 2011



The axial maps of Nakhon Nayok (Table 5.1 and Figure 5.5) reveal the levels of Integration – a value which implies how the level of accessibility in one area, has changed over time. High levels of Integration are represented in red-yellow colours whereas low levels are shown in green-blue colours. Before 1973 the top three levels of Local (R-local) and Global (Rn) Integration were at the bridge and the two connecting roads at the south bank of the river. Linking land use data of the 1970s with historical data, the south bank of the river was the main market or retail area at the time called Wang Sakrajaom Market. This spatial configuration analysis illustrated the core or

spatial centrality of the town, which was related to urban land use and urban expansion of the time.

Nonetheless the spatial configuration analysis of 1997 illustrated that the most accessible area had shifted to the north bank of the river at the intersection of ASEAN Highway 1 (or Suwannasorn Road), Road 3049 and Panitcharoen Road. The structure of the town was strongly related to the bridge at both local and global levels. The main retail area of the period was the municipal wet market called Tetsaban Wet Market, situated on the San Khu Muang Road that linked to Suwannasorn Road and Panitcharoen Road. However, the base map for the spatial analysis was actually produced in 1997, not in 1993 when the Tetsaban Wet Market area was first built. Therefore it is not certain that the location of Tetsaban Wet Market was the core of the town in 1993. It can be concluded however, that four years after the construction of Tetsaban Wet Market was completed, the main retail activity was still located in this area, which was the centre of the town. The level of accessibility of the older retail area (Wang Sakrajaom Market) noticeably declined with the emergence of Tetsaban Wet Market area. There was still a residential area on the south bank which had high levels of accessibility for local usage (see Local Integration in Table 5.1).

It should be noted that between 1997 and 2011 the central bus station and government office cluster emerged on the west side of Suwannasorn Road, which linked the town centre to many important destinations. Moreover, approximately one kilometre away from the existing main retail area to the north, there was the newly installed shopping centre with a discount store and multipurpose vacant space adjacent to it, called Big One Centre, which was the largest in the area. The new bypass road also emerged at the fringe of town on the north at around the same time. These are related to the noticeable

changes in the spatial configuration of Nakhon Nayok town. The core or spatial centrality at the global level had shifted to the west side along Suwannasorn Road continuing on the ASEAN Highway 1.

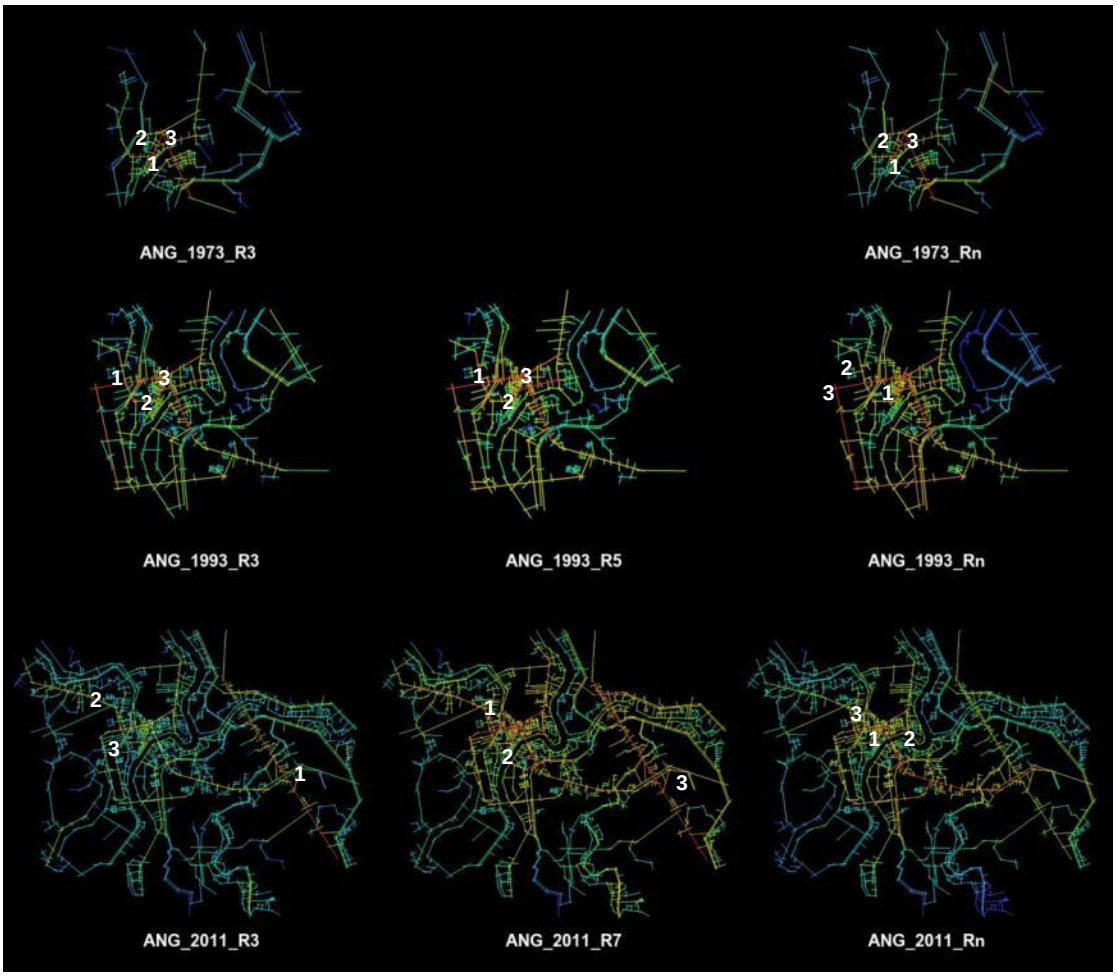
The results also revealed declining degrees of Intelligibility (the coefficient of correlation between Connectivity and Global Integration parameters) of the whole district, from 0.330351 (in 1973) to 0.291832 (in 1997) and to 0.113916 (in 2011). The Synergy (the coefficient of correlation between local and global parameters) of each period also gradually decreased from 0.793844 (in 1973) to 0.686217 (in 1997) and to 0.546158 (in 2011). This could imply not only that the urban development over 50 years had changed the level of accessibility as a whole, but also brought about increasing difficulty for people in navigating the urban space. The road network of local centres once used to connect well within the district, but at that point the degrees of connection with the other parts of the town had decreased. At the local level (see R3 in Table 5.1) there were an increasing number of sub-centres or out-of-town development areas around the main retail area (further details in Chapter 6).

Spatial Configuration Analysis of Ang Thong

Table 5.2 Spatial properties of each development period and top three areas with highest accessibility of Ang Thong town

Year/Rank	Local Integration (R3, R-local)		Global Integration (Rn)	Intelligibility	Synergy
1973	1.39687	-	0.98826	0.320187	0.736306
1st	3.09488	-	1.88005	-	-
2nd	2.86872	-	1.77956	-	-
3rd	2.76699	-	1.65429	-	-
1993	1.54704	-	0.85563	0.111842	0.462348
1st	3.29039	R5: 2.30197	1.38470	-	-
2nd	3.14358	R5: 2.24378	1.37418	-	-
3rd	2.94763	R5: 2.16685	1.30845	-	-
2011	1.52410	-	0.78653	0.067851	0.318472
1st	4.12993	R7: 1.87589	1.22979	-	-
2nd	3.42218	R7: 1.85491	1.17681	-	-
3rd	3.36148	R7: 1.84732	1.13504	-	-

Figure 5.6 Ang Thong Axial maps of 1973, 1993 and 2011



Prior to 1973 Ang Thong (see Table 5.2 and Figure 5.6) had the most accessible areas, at both local and global levels, around the bridge (Tetsaban 1 Road) that linked both sides of the river to Highway 334. The next most accessible area was Tetsaban 2 Road which linked the oldest retail area to the bridge. Thus it can be concluded that the first-period retail area location related to the most accessible area of the time. After 1973 the new bypass road called Highway 334 was built around the existing town centre and it brought about changes in spatial configuration of the district. The bridge remained the most accessible area of the whole district at the global level; at the local level, the new potential locations for sub-centres spread to the north and east side of the old retail area.

Later a roundabout was constructed connecting the existing bypass loop to the ASEAN Highway on the south-eastern fringe. The axial maps of 2011 illustrated the most accessible locations at the time, which were at the town's central intersection continuing to the bridge, and the road linking to the ring road on the southeast. This means that, at the global level, the core area of Ang Thong district had shifted to the newly built ring road southeast of the main retail area and at the local level, the locations of the sub centres were dispersed to the fringes - one on the southeast and another on the northwest of the main retail area.

This analysis, along with the urban structure analysis from the first section, suggests that the transformation of the spatial configuration of Ang Thong town was related to the construction of two road projects; the loop bypass around the town centre built between 1973 and 1993 and part of the ring road on the east prior to 2011. Both developments changed the spatial configuration and also noticeably decreased the levels of Intelligibility and Synergy. Intelligibly was decreased from 0.320187 in 1973 to

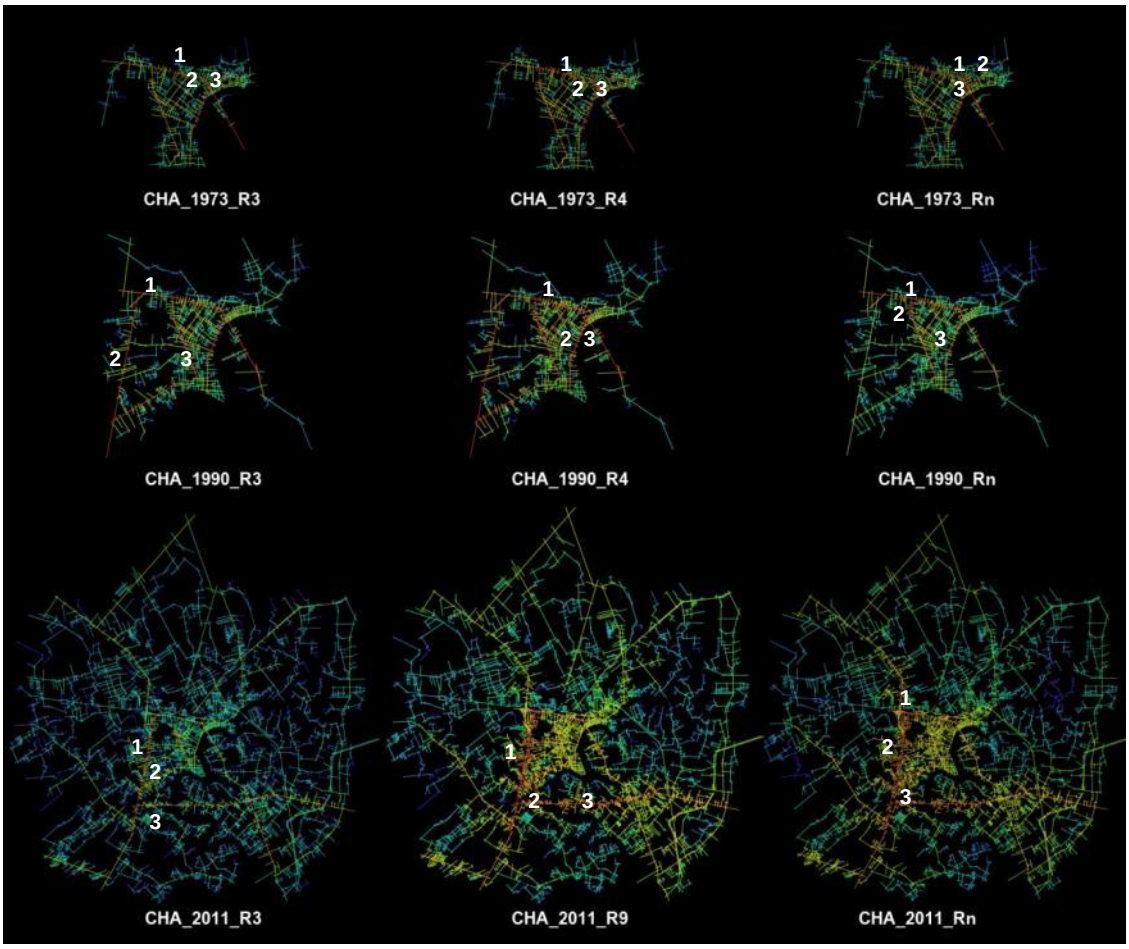
0.111842 in 1993 and to 0.067851 in 2011; and Synergy from 0.736306 1973 to 0.462348 in 1993 and to 0.318472 in 2011.

Spatial Configuration Analysis of Chachoengsao

Table 5.3 Spatial properties of each development period and top three areas with highest accessibility in Chachoengsao town

Year/Rank	**Local Integration** (R3, R-local)		**Global Integration** (Rn)	**Intelligibility**	**Synergy**
1973	1.58158	-	1.14372	0.17389	0.748199
1st	3.69009	R4: 2.90416	2.02401	-	-
2nd	3.46788	R4: 2.81301	1.98075	-	-
3rd	3.36166	R4: 2.75443	1.917	-	-
1990	1.67299	-	1.18683	0.16729	0.729804
1st	3.76199	R4: 2.96825	2.05956	-	-
2nd	3.68945	R4: 2.90935	1.9572	-	-
3rd	3.54719	R4: 2.9073	1.89259	-	-
2011	1.49896	-	0.731713	0.040295	0.418987
1st	4.5936	R9: 1.84362	1.17889	-	-
2nd	4.14047	R9: 1.78627	1.13013	-	-
3rd	3.96285	R9: 1.70504	1.10218	-	-

Figure 5.7 Chachoengsao Axial maps of 1973, 1990 and 2011



From Table 5.3 and Figure 5.7, it can be seen similar to other case studies that the core area of Chachoengsao town in 1973 was at the bridge (Suk Prayoon Road which was built in approximately 1950), which is a part of Highway 315 connecting both sides of the river, and also along the road extended from the core parallel to the river. On the west bank, the north side of the bridge was Chumphon Road, which was the location of the existing main retail area. The west side had clusters of old riverside settlements and temples and included a strip of government offices and housing on Maruphong Road. At the local level (see R3 and R4 in Table 5.3), the top three most accessible roads were Mahajakkapat Road or Highway 304, Maruphong Road and Suk Prayoon Road

respectively. However, these core locations were relatively far from both the first-period retail area and the riverbank or canals, which make it different from the other case study towns of the same period. Considering the secondary data, two retail areas on the riverside area (Kueakoon, and the first Crown Property Bureau or CPB Market) were established before the 1960s, whereas these axial maps were produced from the 1973 spatial configuration. Consequently the spatial configuration illustrated here belongs to a later time. These maps were therefore more related to the location of Bobua Market, which was built as the wet market building shortly before 1970 and then extended with a number of shophouses several years later.

According to the analysis of spatial configuration prior to 1990, the core area of Chachoengsao town was split into many parts at both the global and local levels. The overall town structure as assessed by Global Integration (Rn) revealed that the top three most accessible roads were Mahajakkapat Road, the bridge (which is part of Highway 304), and Sri Sothorn Tat Mai Road. The sub-centre locations as suggested by Local Integration remained in the same locations with a new one on the fringes of Highway 314 towards Bangkok. This location was related to the comprehensive plan of 1990, in which the out-of-town central bus station and shopping arcades were planned and built at the intersection of Highway 314 and Mahajakkapat Road. This could be the beginning of an out of town development, through which the Intelligibility and Synergy of Chachoengsao town slightly decreased; Intelligibility from 0.17389 (1973) to 0.16729 (1990) and Synergy from 0.748199 (1973) to 0.729804 (1990).

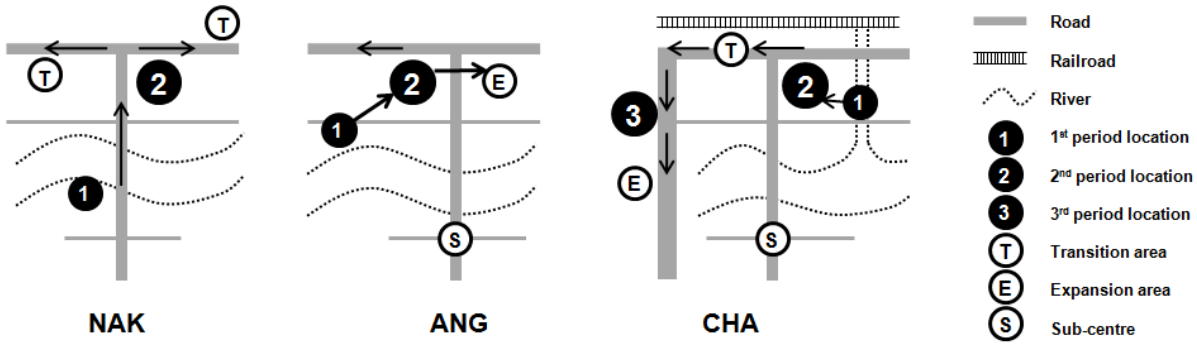
After the construction of a bypass road in the southeast of the town centre in the early 1990s, the core of the whole town shifted to the southwest outside the existing town centre. More recently, the most accessible roads and areas have become the intersection

of two important roads, Highway 314 and Mahajakkapat Road, linked to the highway connected with Suk Prayoon Road on the south. Highway 314 also becomes the most accessible road at both the global and local levels. It not only links to the national Highway 7 (Motorway, first opened in 1998) that leads to Bangkok but also increasingly became the main location for modern trade shopping centres and superstores. On the other side of the town and across the river, a new sub-centre location (see Local Integration of 2011) emerged at the bypass road intersection. This area consisted of a large department store with a hotel, and military camp in the vicinity. These urban projects were built during and shortly after the completion of the bypass road. The Intelligibility and Synergy significantly decreased from the 1990s: Intelligibility 0.16729 and Synergy 0.729804 to 2011 Intelligibility 0.040295 and Synergy 0.418987.

THE DEVELOPMENT OF PROVINCIAL TOWN RETAIL AREAS DURING THE LAST 50 YEARS

The Characteristics of the 50-Year Period of Provincial Town Development

Figure 5.8 The provincial town centre development



From the urban structure and spatial configuration analyses, which are the first two datasets and measurements of the case study towns, the characteristics of the 50-year period of urban growth in relation to retail area development can be summarised in diagrammatic form (see Figure 5.8).

Figure 5.8 illustrates the process of urban change in the case study towns. Number 1 marks the location of the first retail area that could be traced back from the available historical data. The most accessible location or core of the town, which implies the main retail areas in this analysis, shifted further away from the riverbank or canal. The riverside retail areas that emerged before the 1970s were the first-period retail areas, which were commonly found in the central region of Thailand. The selected case study towns were, however, single centre dominated or 'mono-centric' centres. The overall settlement pattern had changed from a naturally growing riverfront alignment of the first-period retail area into the grid pattern and clustering of roads and buildings of the second-period retail area (Number 2). The third or recent period retail areas (Number 3), from around the end of the 1990s, were large-scale modern trade retail developed on highways and bypass roads. At the present time other new sub-centres have also been developed along the main roads or junctions at the fringes in a lineal settlement pattern. In conclusion these medium town centres have recently reached a higher degree of dispersion and made the overall districts more multi-nodal.

In all three cases, there are bridges in the middle of the town centres. According to the Global and Local Integration measures the cores were in the same areas clustering at these bridges, which connected both sides of the rivers. The bridges are therefore significant as the 'core' of the towns themselves in terms of urban structure and spatial configuration. The towns have continuously changed during the study period in a

similar fashion. The spatial configuration of the towns correlates with the urban development and particularly the road network. New developments with an emphasis on road transportation can be seen from the 1970s. However, the greatest impact on spatial configuration was in the 1990s, through the construction of bypass roads at the fringes of towns. According to the urban structure and spatial configuration analyses, the 'core' of the towns has shifted in the direction of newly built bypass roads, particularly when new, large urban projects were built in the area.

Factors Influencing the Urban Development Process through a Consideration of Spatial Configuration

According to the spatial and physical aspects of these towns in this chapter there are two major influencing factors that have been arguably associated with urban transformation in the context of these provincial Thai towns during the last 50 years. First are the positive factors that have generated and stimulated urban growth. In these towns, the initial attractor was the construction of new roads which led to urban expansion. Other positive factors were the construction of main retail areas and shopping centres, offices and industrial clusters, transport nodes such as ports (or piers), central bus stations, rail stations, irrigation channels and riverbanks which benefited agricultural activities. For example, before the 1990s, urban settlements had developed in Ang Thong along the irrigation channels and riverbanks. The agglomeration of retailers was also intensified and developed into a dense grid of small roads within the main retail area. The main transport hub of each period did not only attract new businesses in the same way as other attractors but also effectively relocated the town core towards the established main retail area. According to the theory of natural movement, these positive factors should

in fact be considered as ‘movement’ and ‘attraction’, which are indicators that relate to spatial configuration (Hillier et al., 1993).

On the other hand the river that once acted as a positive factor had become a natural barrier and negative factor over time, particularly in the case of Ang Thong. The negative factors in other case study towns included railway lines and deteriorated areas or those with fire-damaged buildings. For example, in Chachoengsao, the main retail area of the 1970s had been shaped by the railroad on the north side while the river and canal blocked expansion towards the east and south. Recently, urban growth spread further to the west. As a consequence the area behind the railway lines had become low-income settlements with limited accessibility and similar cases are also found in many other towns.

Of considerable importance is a triangular link between the spatial centrality or core of the town, the main retail areas and wet market building, and the transportation nodes of the time. At this point, even though the first two datasets and measurements can help identify the process of provincial town development in terms of the physical and spatial aspects, it is also important to relate these to the political economy in order to pinpoint how urban development in the case study towns links to the process of globalisation.

THE SPATIAL POLITICAL ECONOMY IN THE PROCESS OF URBAN DEVELOPMENT

According to the analysis of the processes of urban development in the provincial case study towns in the previous section, some of the dramatic changes, such as road construction and shifting land use, could be linked to globalisation. These findings are similar to the pattern of urban development that has occurred in many parts of the

world. In Southeast Asia, some researchers have agreed that globalisation has influenced urban development from as early as the 1960s and 1970s (Colombijn, 2002, Christopher and Phongpaichit, 2005). From supporting evidence, the issue here was that modern development altered the spatial structure of the towns from the 1970s (during the third national economic and social development plan). This was seen as the result of the period of the late 1980s to early 1990s, and particularly related to the fifth and sixth (1983-1991) national economic and social development plans that were focusing on modernising the provincial infrastructure (Apawatcharut Charoenmuang, 1999).

In the context of Thai towns, the process of urban development was the result of capitalism through the modernisation in development policies of the post-war governments. The first-period retail areas of the three case study towns were located on the riverside or canal, which was the major transport mode for a long time and eventually declined before the 1970s. Since the third national economic and social development plan in 1972, central government policy began to concentrate on public services and the infrastructure of remote areas (excluding the capital and secondary cities). Instead of promoting the existing ports/piers and railroads, road-oriented development policies including the promotion of the usage of cars and motorcycles were prioritised through economic and military cooperation with some leading and powerful nations. For example, Japan for manufacturing and assembling motorcycles and cars, and the USA for reinstating the education, health care and transport system in Thailand (Christopher and Phongpaichit, 2005). Consequently, during the 1980s, roads and buses became very important since private cars were still unaffordable for many citizens. The first central bus station, commonly extended from the existing town centre, was therefore the most prosperous retail area of the 1980s.

The spatial configuration analysis in the previous sections also revealed that the cores or centrality of the towns have recently shifted to out of town locations. Nowadays, the major mode of transport has dramatically shifted to private cars. New retail areas have been increasingly developed on car-accessible sites in order to avoid traffic congestion and land shortage in central locations. Slum clearance and the reclaiming of public space policies were other issues found in the case study towns and are further discussed in Chapter 8. These market-oriented development policies of Thai governments were not only critiqued as favouring some elites or politicians (Brenner and Theodore, 2002; Davis and Henderson, 2003) but also brought about many problems relating to their long term common benefit and public interest, such as the uncontrolled urban dispersal with traffic congestion and high rates of road injuries in these provincial Thai towns. Thailand was recently ranked the third highest in terms of the annual number of fatal accidents by the World Health Organization (Global Status Report on Road Safety, 2013).

DISCUSSION

The changes in the urban development of provincial Thai towns over the last 50 years were analysed by three sets of data measurements. The first was the measurement of physical urban development which revealed that the built up areas (i.e. land covering) had been expanding and intensifying. The road networks prior to the 1970s also showed their town cores as linked to both sides of the rivers but then this changed in relation to the construction of bypass roads on the fringe of the towns during the 1990s. Over all, urban growth had further spread out of the existing town centres, together with the relocation of public service offices to outside the town centres and also housing estates

and small factories scattered on farmland. The second measurement of spatial configuration over 50 years suggested that the location of the main retail areas, was closely related to the 'integration core' or 'spatial centrality' of that particular time. In the early period before the 1970s the integration cores were located at the main axial road linking both sides of the river and stretching along the river line to the main retail area at the time. Later on the spatial centrality of the towns moved further away from the river and the most recent centrality suggested that locations were on bypass roads or highways, or the fringe areas, linking the town centres to other districts. Therefore a conclusion could be made that the location of the main retail areas, or the live centre, was closely linked to the transportation hub in use at the time, which was also the location with the highest level of accessibility.

Considering the physical and spatial changes in urban development, it was clear that any changes in the public space network such as road construction and large-sized urban project construction had affected the spatial configuration, which was reflected into spatial centrality shifting. There were two types of factors – positive and negative, influencing the urban and spatial configuration of the case study towns.

According to the third set of data on the political economy which is the secondary conceptual framework, this research has shown the process of spatial and physical urban development linking to spatial political economic aspect over the last 50-year period.

There was evidence regarding the dynamic and complex effects of globalisation in the context of provincial towns. Modern development policies and practices in Thailand focused on market-orientation which was influenced by globalisation, and aspects of the Thai state context such as partial capitalism (Athiwanichayaphong, 2009) under military

governments and powerful politicians. Some inappropriate modern developments have failed when applied to different contexts (e.g. Medeiros et al., 2003; Marquez, 2011; Watson, 2005), and have also brought about uneven progress, disagreement and conflicts as addressed in the concept of urban space as a mere 'reproduction of capital' (Harvey, 1985; Harvey, 1996; Smith, 2008).

Chapter 5 has addressed the first research question on how has the socio-spatial structure of retail area development in Thai provincial towns changed over the last 50 years. The changes have been influenced by the policies, practices and specific conditions of provincial Thai towns and these have altered the spatial configuration and spatial political economy of retail areas in the three case study sites. The next chapter 6 will address the second research question: What are the characteristics of urban expansion in relation to retail area development in provincial towns, and does it show any features of spatial segregation in the different contexts?

CHAPTER 6

CHARACTERISTICS OF URBAN EXPANSION AND SOCIO-SPATIAL SEGREGATION IN PROVINCIAL TOWNS

INTRODUCTION

The analysis in this chapter addresses the second research question: What are the characteristics of urban expansion in relation to retail area development in provincial towns, and does it show any features of socio-spatial segregation in the different contexts? The study areas included sub-centres or out-of-town development areas surrounding the main town centre.

In addressing this research question, this analysis focused on further assessment details of three groups of indicators: 1) physical urban expansion, 2) socio- spatial configuration in different areas of the towns and 3) the characteristics of socio-spatial segregation in provincial Thai towns, which were discussed and addressed particularly in relation to social and political economic dimensions.

The data is derived from the field observations, map analysis (i.e. GIS based maps and aerial photographs) and spatial configuration analysis using space syntax. The findings are presented in five sections: 1) Urban development on the fringe of the towns, 2) Socio-spatial configuration of segregation areas, 3) Socio-spatial segregation in the provincial case study towns, 4) Socio-spatial segregation in relation to the political economy and 5) Discussion.

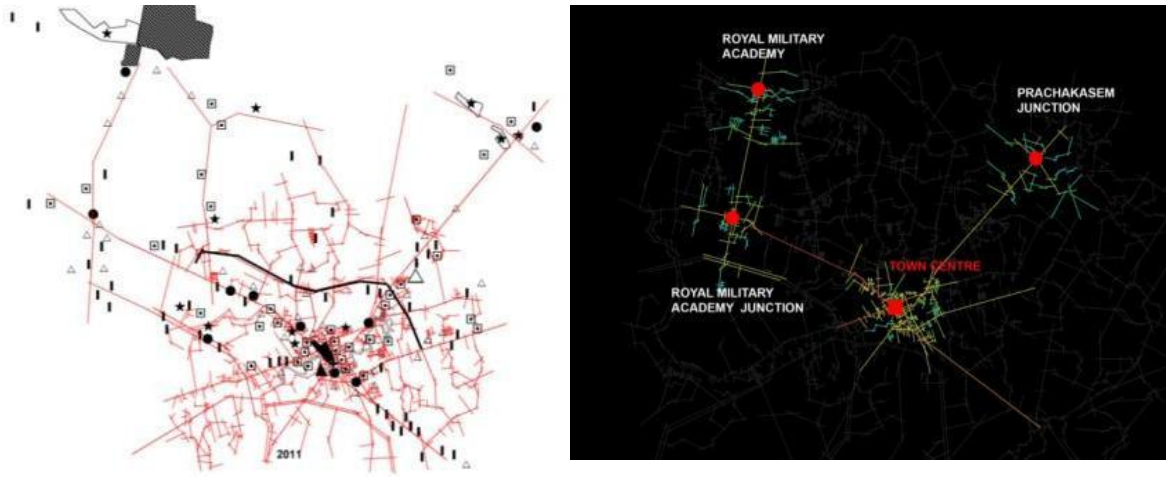
URBAN DEVELOPMENT ON THE FRINGE OF THE TOWNS

This first section of this chapter aims to identify the physical characteristics of each development area, or sub-centre, which could be linked to socio-spatial segregation in urban development by mainly considering land use in terms of: 1) agglomeration and continuity, 2) diversity, and 3) density. The retail areas that were the focus of analysis in Chapter 5 were identified in this chapter as the 'Town Centre Areas' due to the agglomeration and continuity in urban land use. Diversity was analysed by classifying the types of urban land/building use (i.e. wet market building, public-recreation space/park, shopping-leisure place, public services, housing estate, factory/office and self-contained urban project) and degrees of public-private usage. Different degrees of public-private urban land use had been quoted as one of the important indicators of urban segregation (Harvey, 2003, Kozak, 2008). Open Space Ratio (OSR) (Bertaud, 2002) was also applied to measure the density of physical urban development.

Nakhon Nayok

The agglomeration and continuity of urban land use as identified from observation and map analysis revealed a number of densely developed areas in Nakhon Nayok town. Seven areas were initially chosen for the study: 1) the Town Centre which implied the second-period retail area, 2) the Wang Sakrajaom Market Area which was the first-period retail area developed on the other side of the river to Town Centre, 3) the Big One Centre (a large-scale modern trade retailer), 4) the out-of-town central bus station and the government office cluster, 5) the Royal Military Academy, 6) the Royal Military Academy Junction, and 7) Prachakasem Junction.

Figure 6.1 Nakhon Nayok urban land use (left) and new development location (right)



From the analysis of Nakhon Nayok town centre in Chapter 5, the unclear issues were the existence of the third-period retail area: the unpopular out-of-town central bus station including the government office cluster nearby, and the Big One Centre; as well as the decline of the first-period retail area in terms of its economic activity. Considering their distance from the town centre, some development areas were thus regrouped into the vicinity of the Town Centre; they were the areas of Wang Sakrajaom Market, the Big One Super Store, the out-of-town central bus station and local government office cluster. The main building of Wang Sakrajaom Market was partly deserted and partly in use as the wet market; whereas the Big One Centre, out-of-town central bus station and local government office cluster did not have any wet market buildings near them. Finally, in Nakhon Nayok there were a town centre and three sub-centres to be considered: 1) Nakhon Nayok Town Centre, 2) Royal Military Academy, 3) Royal Military Academy Junction, and 4) Prachakasem Junction, as seen in Figure 6.1.

Table 6.1 Urban development of Nakhon Nayok

Development Area	Agglomeration Continuity		Diversity							Density		
			Public Land Use		Semi-public Land Use			Private Land Use				
	Distance from town centre (km)	Settlement form	Wet market	Recreation space/Park	Shopping-leisure	Public services	Housing estate	Factory/Office	Self-contained urban project	Area (km^2)	Built-up area (km^2)	OSR (%)
1) NAK Town Centre	0	Grid	4[2]	3	10	24	22	21	0	7.31	4.96	67.8
2) Royal Military Academy	9.38	Linear	0	0	2	10	4	3	1[3]	8.76	2.21	25.23
3) Royal Military Academy Junction	7.13	Linear	0	1	2	8	5	9	0	3.55	1.14	32.11
4) Prachakasem Junction	8.03	Node	0	3	3	5	1	0	0	1.96	0.71	36.22

Considering the distance from town centre, the sub-centres of Nakhon Nayok town were developed at a distance of between 7.13 to 9.38 kilometres (km) from one another. The settlement form of the Town Centre was a grid-pattern, in which the edge of the area was dispersed along the main road. Considering the observation data from Table 6.1, Nakhon Nayok's Town Centre had the most diversity in terms of urban land use that stood out from other surrounding sub-centres. The combined area of the main town centre, Wang Sakrajaom Market, Big One Centre, out-of-town central bus station and local government office cluster was about 7.31 square kilometres (km^2) in area.

[2] Partial use/active in case of Wang Sakrajaom Wet Market, and two temporary markets
[3] Large-size of self-contained urban project

Figure 6.2 Settlement pattern of the Royal Military Academy

Looking at the axial map of Nakhon Nayok (Figure 6.1), it was clear that the three sub-centres were located further apart and disconnected, in terms of land use, from the main town centre. The Royal Military Academy area is a self-contained urban project, with total area of 8.76 km^2, which was bigger than the Town Centre. Inside the Royal Military Academy were military offices, a college, a residence and a hospital. Meanwhile the community and retail area has developed alongside the main road, particularly at the main entrance to the Royal Military Academy. Aside from the Royal Military Academy itself which was laid out/designed in symmetry grid-pattern, the settlement of the community and retail area outside was in a linear pattern (Figure 6.2). The surrounding community was about 9.38 km from the Nakhon Nayok Town Centre and its built-up area was about 2.21 km^2, which included a 0.86 km^2 golf course attached to the Royal Military Academy. There was no wet market or public recreation

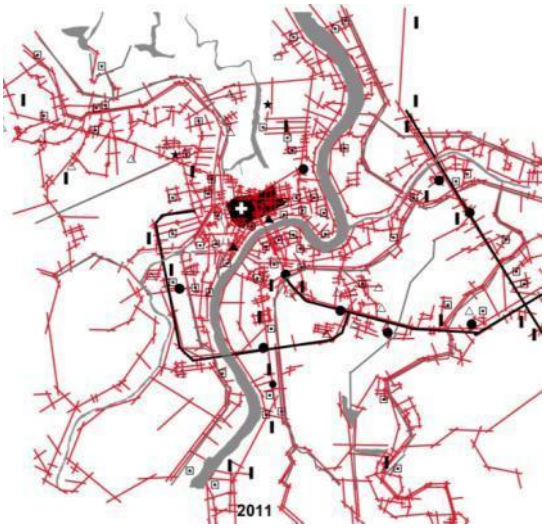
space, however ten public services such as local health centres, schools and four housing estates were found in the area. The Royal Military Academy Junction developed in an unplanned manner at the highway junction that links to Nakhon Nayok Town Centre and Bangkok; however, the settlement was seen spreading along the road, not clustering at the node. The centre of the Royal Military Academy Junction was about 7.13 km from the town centre, with its development area of 3.55 km^2. The area had diverse land use including a commercial area, eight public services, five residential areas and nine small factories/offices without a wet market building.

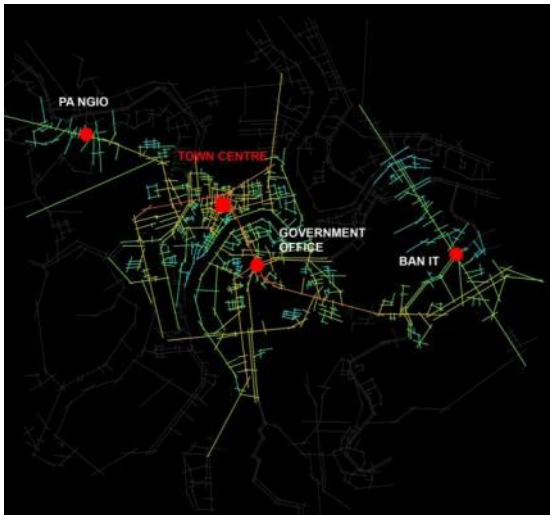
Prachakasem Junction, another sub-centre, was a node of activities on the road Nakhon Nayok-Sarika Municipality. Sarika is a well-known natural tourism destination with a number of resorts in the area. The Prachakasem Junction has developed in a low-density area situated about 8 km from the Town Centre and 3.5 km from Sarika Municipality, with its development area of 1.96 km^2 without a wet market building or factory/offices.

Not only having the most built-up area at 4.96 km^2, Nakhon Nayok Town Centre also had the highest OSR (67.8%) when compared to other sub-centres. Other development areas with considerably lower OSR, despite being sub-centres, were Prachakasem Junction (36.22%), Royal Military Academy Junction (32.11%), and Royal Military Academy (25.23%). Nonetheless, it should be noted that OSR is the first density measurement which is the ratio of built-up area and total development area. In the next section, an analysis of Compactness was presented to assess density related to public space usage.

Ang Thong

Figure 6.3 Ang Thong urban land use (left) and new development location (right)





From the survey, six development areas were identified in Ang Thong town: 1) The first-period retail area, 2) The second-period retail area covering Suwaphan and Tetsaban Market areas, 3) The extension area which included Suwaphan Agricultural Market, 4) the Government office cluster on the other side of the river, 5) Ban It Junction and 6) Pa Ngio Village. Considering the agglomeration and continuity of urban land use as similar to the Nakhon Nayok case, the three periods of retail area were grouped into the same cluster – the town centre. There were thus four development areas in this analysis part: 1) Ang Thong Town Centre, 2) the Government office cluster, 3) Ban It Junction and 4) Pa Ngio Village, as seen in Figure 6.3.

Table 6.2 Urban development of Ang Thong

Development Area	Agglomeration Continuity		Diversity							Density		
			Public Land Use		Semi-public Land Use			Private Land Use				
	Distance from town centre (km)	Settlement form	Wet market	Recreation space/Park	Shopping-leisure	Public services	Housing estate	Factory/Office	Self-contained urban project	Area (km^2)	Built-up area (km^2)	OSR (%)
1) ANG Town Centre	0	Grid	3	0	4[4]	24	5	4	0	3.8	2.34	61.6
2) Local government office	1.4	Node	1	1	4	13	6	5	0	3.3	1.7	51.5
3) Ban It Junction	3.17	Linear	1[5]	0	5	12	8	8	0	3.2	1.52	47.5
4) Pa Ngio Village	3.07	Linear	1	1[6]	2	10	3	1	0	1.8	0.8	44.4

The sub-centres of Ang Thong were situated in proximity to the main town centre (from 1.4 to 3.17 km), which clearly differed from the Nakhon Nayok case (Table 6.2). The Town Centre had developed compactly with its development area of 3.8 km^2 covering the first- and second-period markets and the extension retail areas. The settlement form was a grid-pattern, with four large active wet markets: Tetsaban Market 1 and 2, Suwaphan Market, and Suwaphan Agricultural Market, which was the centre for agricultural wholesale in the central region. At the north edge of Ang thong Town Centre, about 1.4 km from the main retail area, stood the Tetsaban Water Park; a large-size recreation and amusement park for public use. Emerging in the agricultural green zone on the fringe of town (Figure 6.4-above), it was operated in a semi-public manner by limiting accessibility with fencing and security guards, as well as an entrance fee.

[4] Include Tetsaban (Reservoir) Water Park – amusement park
[5] Temporary market
[6] Provincial Sports Stadium

From the observation survey and secondary data, neither a public recreation park nor promenade was found in the town centre, unlike the cases of Nakhon Nayok and Chachoengsao which both had riverside recreation parks.

Figure 6.4 Out-of-town developments in Ang Thong: Tetsaban Water Park (above), housing estate (below)

Even though the Government office cluster was only about 1.4 km from the town centre, it was fairly separated in terms of its catchment area - in the southern area of the town centre. From the map analysis and observation, a large cluster covering the development area of 3.3 km^2 was identified; it included Government institutions such as the City Hall, the Provincial Court, the College of Performing Arts and 13 other public services. The area also included six housing estates and a small wet market with retail areas. Over the past 50 years, the urbanised area had been spreading on this side of the river and thus becoming a sub-centre. The commercial buildings were densely

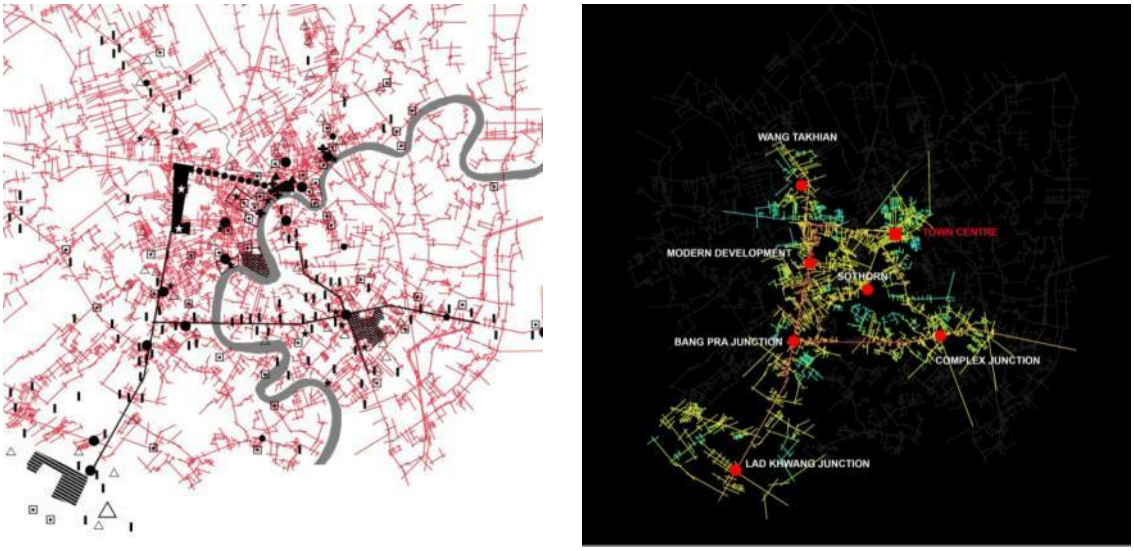
agglomerated along the roadside to the bypass junction, which had made this sub-centre a node-type settlement form.

Ban It Junction was an area developed near the junction of highways and the ring road, which linked to Bangkok. It was about 3.17 km from the centre of the area to Ang Thong Town Centre. The retail space of the area spread along the roadside in at least five locations in a disconnected form. The development area of 3.2 km^2 included the local public services such as local health centres and schools in 12 locations. It should be noted that there were more housing estates (8) (Figure 6.4-below and factories/offices (8) in this area, compared to other sub-centres. The final area was Pa Ngio Village; a small development area of 1.8 km^2 and about 3.07 km from the town centre. The retail businesses and shophouses grew alongside the main road for about 1.7 km. An important land use/building in this area was a provincial sports stadium. Other community public services of the area were dispersed in about 10 different locations.

Ang Thong Town Centre had the largest built-up area of 2.34 km^2, which led to the highest OSR of 61.6%. This was also seen from the map analysis which showed the dense urban area that had developed in the main town centre of Ang Thong. There was not a big difference in OSR between sub-centres, in which the Government office cluster was 51.5%; Ban It Junction, 47.5%; and Pa Ngio Village, 44.4%.

Chachoengsao

Figure 6.5 Chachoengsao urban land use (left) and new development location (right)



Considering the urban land use and spatial analysis (R2) of Chachoengsao, there were ten areas (Figure 6.5) in which the settlements were considerably more dense than the surrounding areas; these include: 1) Chachoengsao Town Centre, 2) Mahajakkapat Road, 3) Ban Mai Market, 4) Sothorn Temple Area, 5) Sri Sothorn Tat Mai Road, 6) Big C and the New Bus Terminal, 7) Bang Pra Junction, 8) Lad Khwang Junction, 9) Wang Takhain Village and 10) Complex Junction.

Seven areas were finally selected for study by using the same criteria applied to other case study towns. Six sub-centres were developed around Chachoengsao Town Centre, located 2.25 to 4.55 km away from the main town centre; whereas Lad Khwang Area was much further away at 8.8 km. The main town centre (the first and second period retail areas) was the first study area with the most densely populated urban development.

Table 6.3 Urban development of Chachoengsao

Development Area	Agglomeration Continuity		Diversity							Density		
			Public Land Use		Semi-public Land Use			Private Land Use				
	Distance from town centre (km)	Settlement form	Wet market	Recreation space/Park	Shopping-leisure	Public services	Housing estate	Factory/Office	Self-contained urban project	Area (km^2)	Built-up area (km^2)	OSR (%)
1) CHA Town Centre	0	Grid	5	7	16	65	8	2	0	4.2	3.1	73
-Mahajakkapat Rd	-	Linear	0	1	3	8	2	0	0	-	-	-
-Ban Mai Market	-	Grid	0	1	4	3	6	2	0	-	-	-
2) Sothorn Temple Area	2.35	Grid	2	1	1	5	0	0	2[7]	1.2	0.8	63
3) Modern Shopping Area	2.25	Linear	1[8]	0	8	4	3	1	0	5.5	3.1	57
-Sri Sothorn Tat Mai Rd	-	Linear	1[9]	1	4	6	2	1	0	-	-	-
4) Bang Pra Junction	4.55	Linear	0	0	3	7	6	13	0	4.9	2.7	55
5) Lad Khwang Junction	8.8	Linear	0	0	2	7	6	13[10]	0	11	3.6	33
6) Wang Takhain Village	2.98	Linear	1	1	4	7	6	9	0	4.4	1.8	42
7) Complex Junction	3.95	Node	2[8]	0	10	20	17	37	1[11]	16	6.5	42

The Mahajakkapat Road and Ban Mai Market were considered as expanded areas of the town centre. Mahajakkapat area was characterised by dense roadside retail buildings formed in a linear style of over 1.5 km in length. Ban Mai Market, on the other hand, was established before 1950 and gradually declined; until 2004 when the regeneration

[7] Large-size self-contained urban project, include the Military base camp, and the cluster of university and local government institutions
[8] Central bus station wet market building which was only used on the ground floor as street food vendors and kiosks while the upper floor was unoccupied
[9] Temporary market
[10] Mid-large-scale of industrial businesses
[11] Military base camp

and tourism programme started to rehabilitate the community. This waterfront retail area developed in a grid pattern from the riverbank expanding to connect with the public road at the junction. However, these two recent developments did not have wet markets, which were considered an indicator of an economically vibrant area or live centre in this research. At a town level, both areas were thus categorised as part of the town centre and made the development area of 4.2 km^2 for the Chachoengsao Town Centre (number 1). According to fieldwork observation (see Table 6.3), there were five wet markets, seven public recreation spaces/parks, 16 shopping and leisure places, 65 public services and eight housing estates, but only two medium-to-large factories/offices and no self-contained urban projects in the area. The settlement form of the town centre was a dense-grid of many small roads with a linear pattern on the west end of the Mahajakkapat Road and a node pattern on the east end at Ban Mai Market.

Sothorn Temple Area (number 2) was one of the oldest developed areas which had been simultaneously developed with a nationally well-known temple. The temple site was located on the waterfront, surrounded by retail buildings, a small wet market and retail outlets and services to facilitate both the community and visitors. The development area was about 1.2 km^2. Even though this sub-centre was located close to the town centre (2.35 km), when considering agglomeration and continuity, there was a university and government institutions nearby, which could be described as semi-public land usage, and also a Military base camp with restricted access. The university and military camp were large-scale, self-contained urban projects covering a total area of 1.15 km^2 along the 1.7 km length including the nearby government institutions. This cluster of private and semi-public projects blocked the Sothorn Temple Area from the town centre as described. Apart from this, the area also had some tourist attractions with a small wet

market in the area, which was another reason to support the separation of the Sothorn Temple Area from the town centre.

Figure 6.6 Motel (left) and night club (right) in modern-style in the third-period retail area

During the survey in 2011 and 2013, it was observed that the main retail area on the western bypass road had developed in the form of modern large-scale retail units, which were the Big C Super Centre and Major Cineplex, the out-of-town central bus station area, and newly built HomePro and Thai Watsadu home material and decoration retailers. Another part was the commercial area, developed around the node of Sri Sothorn Tat Mai Road, in which the Carrefour Super Centre was the main attraction of the area. There was also an empty land space, part of the Boxing stadium that was used twice a week to organise a temporary outdoor market, which was very popular among the municipal population and attracted people from out of town as well. The continuity of this development area with a modern trade style thus created a Modern Shopping Area cluster (number 3), which was the third-period retail area, as studied in the previous chapter, with a total development area of 5.5 km^2 and about 2.25 km away from the town centre. It should be noted that these large-scale retail units were located alongside the main roads spreading from one road junction to another; therefore, the settlement form was a linear pattern which determined the overall activities in the urban

space. Most retail buildings in the area were newly constructed and retailers were mainly service businesses, such as offices, restaurants, and internet services. There were also night clubs, condominiums and motels which were not sited in other areas (Figure 6.6).

Bang Pra Junction (number 4) was another new development area at the south-western bypass road adjacent to the modern shopping area, about 4.5 km from the town centre, with 4.9 km^2 of development area. When considering the land use type, Bang Phra has 13 locations of factories/offices, six housing estates and one temporary market in the area. Bang Pra Area has densely developed at the junction and then expanded along the main road on the east end. Another area that grew in a linear-pattern was Lad Khwang Area (number 5), located 8.8 km from the town centre with an 11 km^2 development area. The area had a linear development style along the highway that linked to the expressway junction to Bangkok about 8.5 km further away. The main activity of the area was the factory cluster, in which the medium to large scale of industrial businesses included a TOYOTA automobile assembling factory. This whole area of development was linear, in which the land plots located alongside the highway were narrow. There were also six housing estates, in which some were large-scale projects for industrial workers. Wang Takhain Area (number 6) had a linear settlement pattern. It was located on the north side next to the rail station, with a development area of 4.4 km^2 and 2.98 km southwest of the town centre. Its diverse urban land use consisted of a small wet market, a temporary market, six housing estates, seven public services and nine small factories/offices. Despite being close to the modern trade and transition area on the Mahajakkapat Road, the area was developed separately with limited accessibility because of a railway line blocking road access.

The last development area with a node-pattern was Complex Junction (number 7), with the largest development area of 16 km^2 and a distance from the town centre of 3.95 km. There were 20 public services, 17 housing estates and 37 factories/offices, which were the largest number of the whole Chachoengsao development area. The large number of factories/offices could imply that the area had a high employment rate which had led to the greater number of housing estates and public services. The greatest density of retailers in this area was at the bypass road junction, which was the location of the first out-of-town department store of the province, including retail buildings, hotels and a golf course, as well as another military base camp which was the second camp in the province covering about 0.7 km^2 and categorised as a self-contained urban project.

The OSR of Chachoengsao Town Centre was the highest at 73%, Sothorn (63%), Modern shopping area (57%) and Bang Pra (55%). Even though Wang Takhain Village and Complex Junction had big differences in terms of development as well as in built-up areas, they had similar percentages of OSR (42%). Lad Khwang Area had the lowest OSR (33%) compared to other sub-centres.

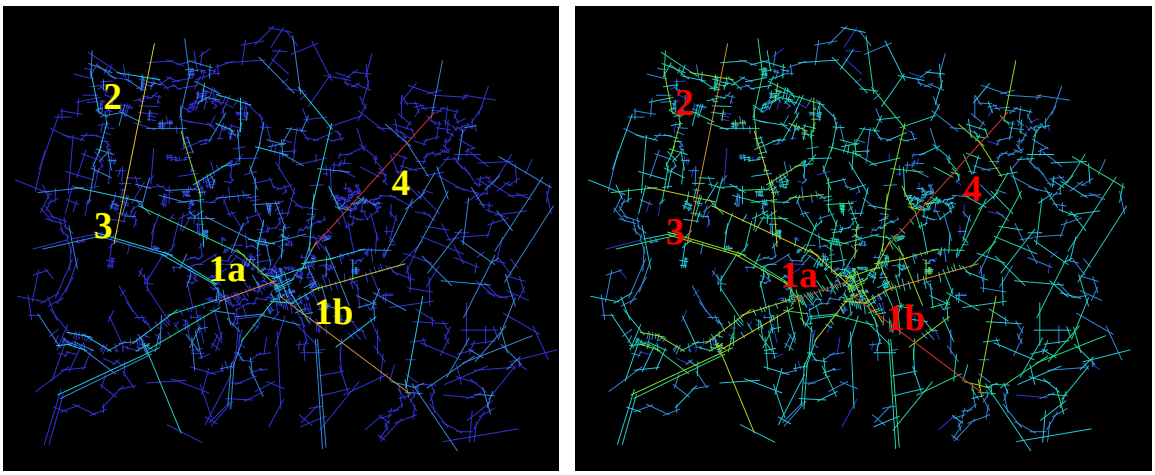
SPATIAL CONFIGURATION OF SEGREGATED DEVELOPMENT

This section analysed three sets of spatial properties. The first set is Connectivity (conn) and two-step Integration (R2) – to identify the location of the sub-centres as suggested by space syntax methodology. The second set of spatial properties was used to illustrate the spatial configuration in order to analyse and compare between the development areas. It consisted of the levels of accessibility (i.e. Local and Global Integration); mean depth – one of spatial properties identifying how difficult it is to access one location from another, Intelligibility (int) and Synergy (syn). The last set was Compactness

which aimed to measure the density of public space usage. Compactness could be drawn out from the proportion of the number of axial lines (from the axial map in space syntax analysis) and development areas (convex space in space syntax analysis).

Nakhon Nayok

Figure 6.7 The location analysis of sub-centre of Nakhon Nayok by Connectivity (left) and R2 (right)



The axial maps present the possible locations for sub-centres by considering Connectivity and two-step Integration (R2) from spatial configuration analysis. In this analysis, the more red-yellow colours mean the higher degree of a local level of accessibility or 'sub-centre'. In Figure 6.7, both Connectivity and R2 analysis presented the same results of the roads and areas that were the locations of sub-centres in Nakhon Nayok town (numbers 1 to 4). This could imply that the physical settlement was linked to the spatial configuration of the town. The first locations were on the Nakhon Nayok-Rangsit Road (number 1a) and the Suwannasorn Road, where the first-period retail area is situated (1b). These areas were classified as a part that expanded from the town centre (as analysed in the previous section). The next location on the west side was the road

that linked Nakhon Nayok-Bangkok Junction to the Royal Military Academy, in which the location of the Royal Military Academy was represented by number 2 and number 3 represented the Royal Military Academy Junction. The northeast location was Nakhon Nayok-Sarika Road, in which number 4 represented Prachakasem Junction.

Table 6.4 Spatial properties of Nakhon Nayok town in 2011

Development Area	Spatial Analysis					
	R6	Rn	MD	intel	syn	Compactness
NAK Town	1.1734	0.8028	11.4895	0.0911	0.4673	-
1) NAK Town Centre	1.5225	1.0691	8.6310	0.3371	0.7636	48.45
2) Royal Military Academy	1.2481	0.8101	11.0576	0.2078	0.7328	11.19
3) Royal Military Academy Junction	1.2868	0.8789	10.3604	0.2918	0.6929	14.65
4) Prachakasem Junction	1.2979	0.8690	10.4434	0.1817	0.9044	21.94

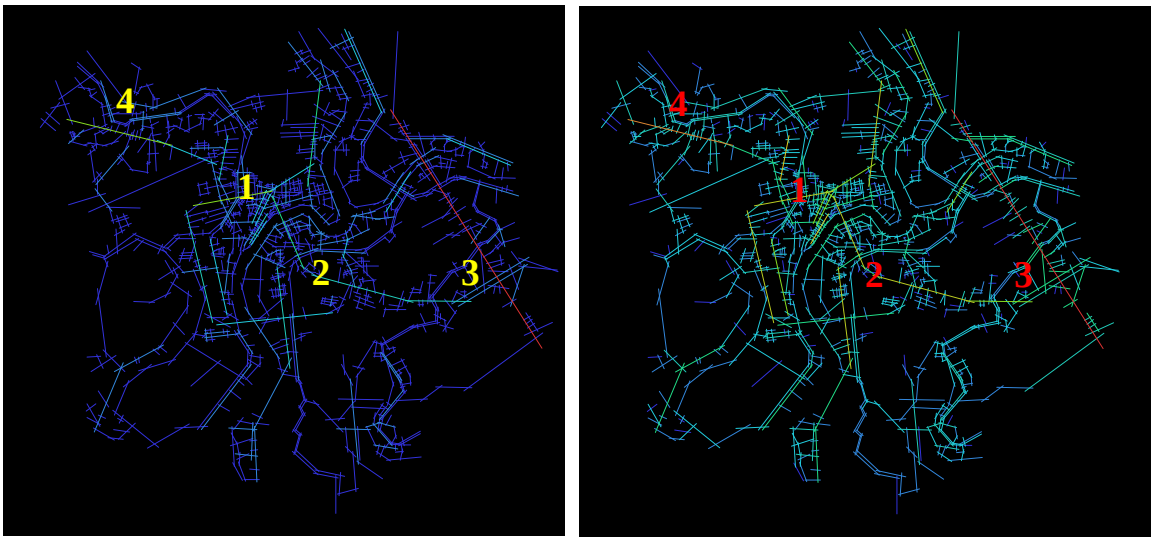
The processed spatial properties of Nakhon Nayok town (Table 6.4) show the two distinctive areas; Nakhon Nayok Town Centre and Royal Military Academy. On one hand, the Nakhon Nayok Town Centre had the highest level of accessibility at both local and global levels including Intelligibility, whereas the mean depth (MD) was found to be very low. In spatial analysis, it could be explained that Nakhon Nayok Town Centre had a spatial configuration that stood out from the surrounding sub-centres in terms of accessibility. This area also had the spatial road network that was easy to comprehend and navigate by users (i.e. Intelligibility: 0.3371) when compared to other sub-centres. On the other hand, the Royal Military Academy area showed the lowest levels of accessibility (both at local and global levels) and also the highest rate of mean depth (MD) at 11.0576. Even though this area had similar degrees of Synergy to the

town centre; compared to other sub-centres it still had the highest degree of spatial segregation.

In terms of Compactness, which was defined and applied as the degrees of public usage in this research, Nakhon Nayok Town Centre had the highest Compactness (48.45) when compared to the surrounding sub-centres, followed by Prachakasem Junction (21.94) and the Royal Military Academy Junction (14.65). The Royal Military Academy Area showed very low Compactness at 11.19, because about half of its built-up area was for private and semi-private land uses such as the Royal Military Academy and golf course.

Ang Thong

Figure 6.8 The location analysis of sub-centre of Ang Thong by Connectivity (left) and R2 (right)



Similar to Nakhon Nayok, both the Connectivity and R2 revealed the potential locations of sub-centres of Ang Thong town, which correlated to the urban settlement as identified from the map analysis. The first location (number 1 area in Figure 6.8)

contained several roads linked to Bypass 334 that continued and expanded from Ang Thong town centre. For the purposes of this research they are combined into one study area. The second location (number 2) was the Government Office Cluster. Even though this area seemed to be a part of Highway 309 that directly connected to the town centre, when taking into account the observational data as described in the previous section, it was decided that the Government Office Cluster should be analysed separately. The third area (number 3) was Ban It Junction which was noticeably developed alongside the main road; and the final area was Pa Ngio Village as number 4.

Table 6.5 Spatial properties of Ang Thong Town in 2011

Development Area	Spatial Analysis					
	R6	Rn	MD	intel	syn	Compactness
ANG town	1.2100	0.7865	11.2086	0.0679	0.3185	-
1) ANG Town Centre	1.5295	1.0195	8.6794	0.3198	0.6683	66.84
2) Local Government Office	1.3092	0.9322	9.4769	0.1316	0.5452	58.79
3) Ban It Junction	1.4399	0.8345	10.3610	0.0285	0.1006	31.25
4) Pa Ngio Village	1.3555	0.8206	10.4515	0.1170	0.4754	25.56

In Table 6.5, Ang Thong Town Centre was the core of the town with the highest levels of accessibility (Local Integration: 1.5295, Global Integration: 1.0195), Intelligibility (0.3198) and Synergy (0.6683) and the lowest mean depth (8.6794). Compared to surrounding sub-centres, the town centre was therefore not only easy to access but the spatial (road) network of this area was also user-friendly and integrated within the whole area. Considering the levels of accessibility, the Government Office Cluster had very low Local Integration (1.3092), whereas at the global level, Pa Ngio Village (0.8206) and Ban It Junction (0.8345) were the most difficult-to-access areas. In terms

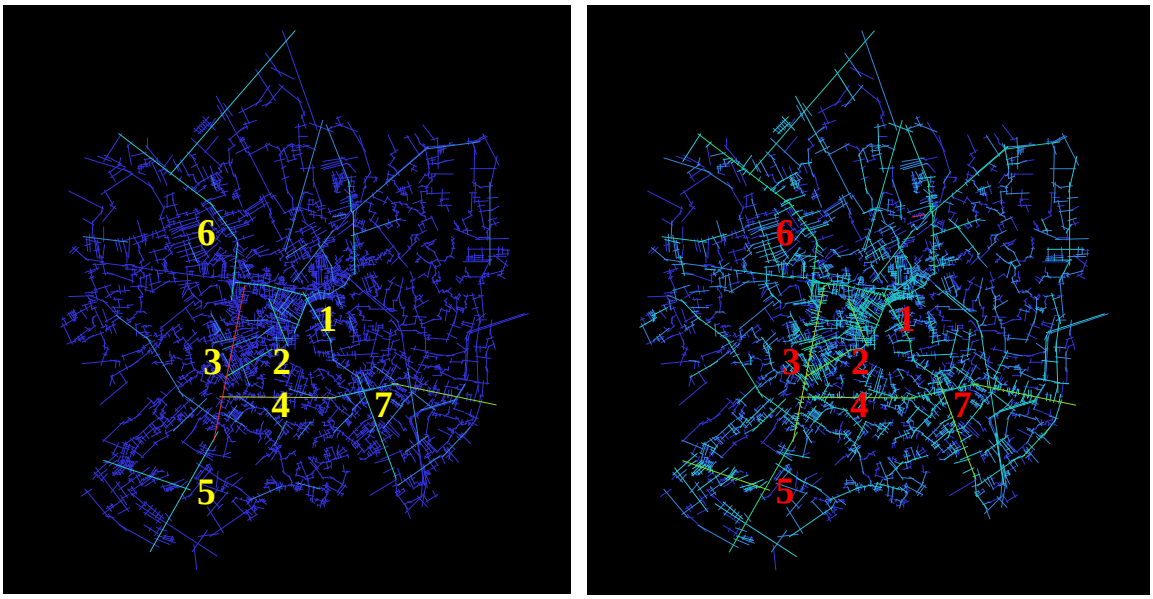
of Intelligibility and Synergy, Ban It Junction had the lowest rates at 0.0285 and 0.1006, which meant that the spatial network (of roads) of this sub-centre was difficult to understand and the users could get lost easily while travelling in the area, as well as low spatial connection to other parts of the town. Both Pa Ngio Village (10.4515) and Ban It Junction (10.3610) had higher potentials for spatial segregation than other sub-centres.

Ang Thong Town Centre had the highest Compactness at 66.84. The next area was the adjacent development area of Government Office Cluster at 58.79. This meant the existing town centre had the highest public-space use compared to surrounding sub-centres. Whereas the out-of-town development such as Ban It had low Compactness (31.25), as well as Pa Ngio (25.56) which implied the lowest degrees of public usage in Ang Thong town.

Chachoengsao

The preliminary urban development survey showed more than 10 potential locations of sub-centres, due to Chachoengsao being the most complex in terms of urban growth among the case study towns. They were Wang Takhian Village, Ban Mai Node, the Modern Shopping and the out-of-town Central Bus Station Area, the Sri Sothorn Tat Mai Road, the Government Office Cluster, Sukprayoon Road, Sothorn Temple Area, Bang Pra Junction, Complex Junction, Lad Khwang Junction, the settlement along local Road 304, and Mahajakkapat Road.

Figure 6.9 The location analysis of sub-centre of Chachoengsao by Connectivity (left) and R2 (right)



After considering the agglomeration and continuity from map analysis (Figure 6.9), seven sub-centres were selected: 1) Chachoengsao Town Centre covering the first-and second-period of retail areas, Ban Mai Node, the Mahajakkapat Road, 2) Sothorn Temple Area, 3) the Modern Shopping Area covering the modern shopping areas of Big C, Major Cineplex, HomePro, Thai Watsadu, Carrefour and the out-of-town Central Bus Station Area, 4) Bang Pra Junction, 5) Lad Khwang Junction, 6) Wang Takhain Village, and 7) Complex Junction.

Table 6.6 Spatial properties of Chachoengsao Town in 2011

Development Area	Spatial Analysis					
	R9	Rn	MD	intel	syn	Compactness
CHA town	1.0151	0.6889	15.6595	0.0392	0.3968	-
1) CHA Town Centre	1.2503	0.8360	12.4437	0.1189	0.4206	82.34
2) Sothorn Temple Area	1.2912	0.8533	12.2454	0.1596	0.6810	66.94
3) Modern Shopping Area	1.2901	0.8694	12.0795	0.0790	0.6286	60.91
4) Bang Pra Junction	1.2872	0.8632	12.3079	0.0584	0.5932	44.44
5) Lad Khwang Junction	1.2762	0.8395	13.0114	0.1005	0.4976	7.15
6) Wang Takhain Village	0.9887	0.7287	14.2195	0.0560	0.2384	38.16
7) Complex Junction	1.1566	0.7862	13.2693	0.0871	0.5926	30.06

Unlike Nakhon Nayok and Ang Thong, Chachoengsao Town Centre had ceased to be the most accessible area of the town. Three areas showed similar high levels of accessibility (Table 6.6); the Modern Shopping Area (R9: 1.2901, Rn: 0.8694, MD: 12.0795), Bang Pra Junction (R9: 1.2872, Rn: 0.8632, MD: 12.3079), and Sothorn Temple Area (R9: 1.2912, Rn: 0.8533, MD: 12.2454). Conversely, Wang Takhain Village had the lowest levels of accessibility at both local (0.9887) and global (0.7287) levels and also the highest mean depth at 14.2195. This meant the area was difficult to access and tended to segregate from the whole town when compared to the other sub-centres. It was also observed that Wang Takhain Village, which was located behind the railway line parallel to the Mahajakkapat Road, was poorly connected with the other parts of the town, particularly with only one road that linked it to Mahajakkapat Road.

In terms of Intelligibility and Synergy, Sothorn Temple Area had the highest degree at 0.1596 and 0.6810, while Wang Takhain Village possessed a very low degree at 0.0560

and 0.2384. Noticeable differences were found in Intelligibility. The first group with a high degree consisted of Sothorn Temple Area (0.1596) and Chachoengsao Town Centre (0.1189) and Lad Khwang Junction (0.1005). The second group with a very low degree were the Modern Shopping Area (0.0790), Bang Pra Junction (0.0584), Wang Takhain Village (0.0560) and Complex Junction (0.0871). The difference was found among sub-centres in the high-Intelligibility group, in which Lad Khwang Junction was the only new development area characterised as a factory, while others were old development areas.

Similar to Nakhon Nayok and Ang Thong, Chachoengsao Town Centre had the greatest public usage with the highest Compactness of 82.34, followed by Sothorn Temple Area, (66.94) which was one of the old development areas. Among the out-of-town developments of Chachoengsao, the Modern Shopping Areas had the highest degrees of public space use (Compactness: 60.91). The next sub-centres were Bang Pra Junction (44.44), Wang Takhain Village (38.16), and Complex Junction (30.06). Lad Khwang Junction had an extremely low Compactness of 7.15, which meant this sub-centre had less usage by the public. This could be explained by the observation that the majority of land use of the area was semi-public such as factories and housing estates.

SPATIAL SEGREGATION IN THE PROVINCIAL CASE STUDY TOWNS

Considering the first two sets of data and measurements of physical and spatial aspects, as proposed at the beginning of the chapter, the common characteristics of the segregation in urban development could be divided into four aspects; 1) Lack of diversity in public land use, 2) Discontinuity of urban growth, 3) Low levels of spatial

accessibility and connectivity and 4) Imbalance between physical development and public usage.

Lack of Diversity in Public Land Use

Among the case study areas, the Town Centre had the greatest mix of public land use, such as wet market and public recreation space, compared to sub-centres. Conversely, some sub-centres were found to be lacking a mix of land use, particularly the out-of-town areas which were developed for a specific user group. An explanation for why diversity in public space use related to urban segregation was that gated communities or high-privacy urban projects were identified as a cause of spatial segregation and fragmentation and were linked to social segregation. The sub-centres that were found lacking in diversity of public land use were the Lad Khwang Area and the Royal Military Academy in Nakhon Nayok, for example. From a spatial configuration aspect, a lack of diversity in public space usage also resulted in a very low degree of Compactness of one area, as further discussed in the next subsection 'low levels of accessibility and Connectivity'.

Considering the statistical relationships among indicators (types of urban land use) the study also revealed significant correlation among numbers of wet markets, shopping and leisure places, public services-public parks and recreation (r: 0.641 to 0.906), which indicates that these four types of urban land use are often clustered in the same areas. This evidence concurred with urban studies literature that has pointed out the relationship between low public services such as inefficient public transportation as a feature of segregated areas (Camagni et al., 2002; Jenks et al., 2008).

Discontinuity of Urban Growth

Except for the scattered commercial areas along the highways that developed outside of the town's planning control regulations, urban development in some areas was blocked by gated urban projects that directly affected the continuity of public space use. This evidence related to contemporary urban development such as urban sprawl/fragmentation, in which urban growth was emerging as unregulated and unrelated to the existing urban development. Discontinuity of public space not only separated urban spaces in terms of permeability/accessibility but also led to social conflicts between retailers particularly in prime locations. For example, the fieldwork observation showed that the Mall Shopping Centre in Nakhon Nayok's town centre strictly prohibited public access and prevented the sharing of (public) space in front of the property. This caused conflicts between the owner of the Mall Shopping Centre and the owners of neighbouring shophouses, as is further discussed in Chapter 7.

Low Levels of Spatial Accessibility and Connectivity

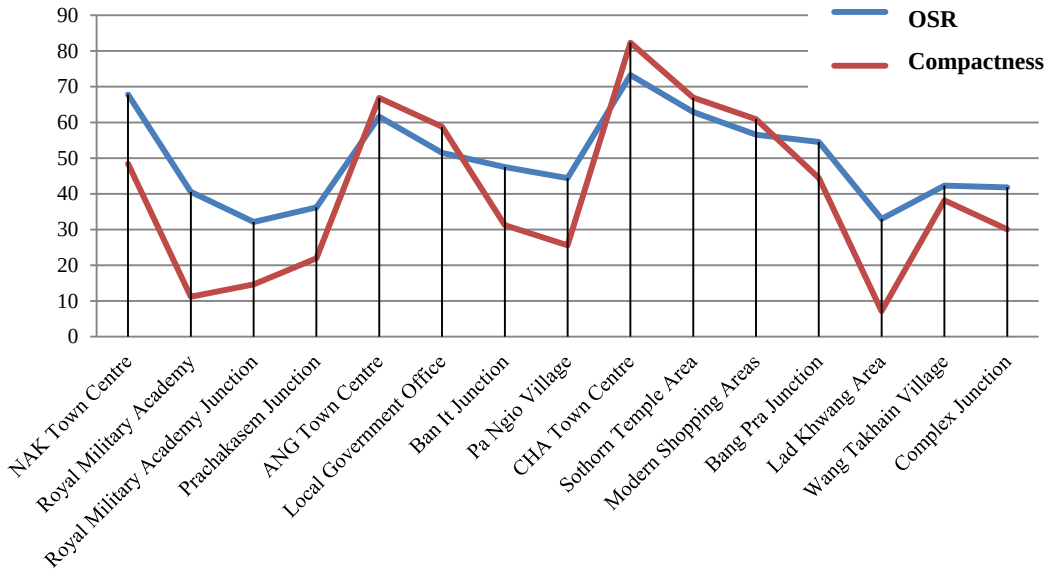
Spatial configuration studies define spatial segregation as an unintegrated spatial network; an area with low spatial properties including Integration, Intelligibility, and Synergy. Theoretically, an unintegrated area indicates a lack of a strong economic centre of the area (van Nes, 2007). In this research, the characteristics of socio-spatial segregation as revealed in the case study towns were the difficult-to-access areas with low levels of accessibility (Integration) and high mean depth (MD). From all the case study sites, the set of spatial properties revealed the segregated areas from other parts of the town. In Nakhon Nayok case, the Royal Military Academy and the Royal Military Academy Junction had lower spatial properties than other areas. In Ang Thong, the areas with low spatial properties were Ban It Junction and Pa Ngio Area. In the case of

Chachoengsao, there were three areas detected, Wang Takhain Village, Lad Khwang Area, and Complex Junction. However, unlike the levels of accessibility and mean depth, the trend of having both low Integration and Synergy in the same area was not found in this research. For this reason, levels of accessibility (i.e. Local and Global Integration) and mean depth are suggested for the consideration of spatial segregation degrees in provincial case study towns.

The difference between (very low) Intelligibility and (high) Synergy was found in the new development sub-centres, which were clearly seen in Modern Shopping Areas (Intelligibility: 0.0790, Synergy: 0.6286), Bang Pra Junction (Intelligibility: 0.0584, Synergy: 0.5932), Complex Junction (Intelligibility: 0.0871, Synergy: 0.5926) and Lad Khwang Junction (Intelligibility: 0.1005, Synergy: 0.4976) in Chachoengsao. On one hand, the reason might be connected to the highly accessible locations which made the areas connect to other parts of the town conveniently (high Synergy). On the other hand, modern development was rapid and immediately attracted surrounding development particularly in an area without any control regulations. Urban sprawl and scattered areas were inevitable as a result, which affected the socio-spatial structure of the towns and led to segregated developments to some degree. This evidence suggests that low Intelligibility is a feature of urban development in the context of provincial Thai towns.

Imbalance between Physical Development and Density of Public Usage

Figure 6.10 Difference between OSR and Compactness



This research explored the density in urban development by considering OSR (open space ratio) and Compactness, which were applied to measure the density of public space use. From Figure 6.10, five areas had compactness higher than OSR, which suggested that the areas had high density in public space use. This trend was found in the prosperous economic areas such as Town Centre and Modern Shopping Area. Spatial configuration analyses revealed the link between spatial segregation (low spatial properties) and unsuccessful economic centres. It should be noted at this point that the trend of differences between OSR and Compactness could be linked to the concept of spatial segregation in these case study towns.

On the other hand, 10 out of 15 studied sub-centres suggested the same trend of having higher degrees of OSR than compactness, which meant that the areas had higher physical development density than public usage density. This pattern could be found in

the large-scale and private/semi-private urban land use developed in the linear form, such as factory clusters, self-contained urban projects and exclusive urban land use, such as golf courses.

SPATIAL SEGREGATION IN RELATION TO THE POLITICAL ECONOMY IN THE CONTEXT OF PROVINCIAL THAI TOWNS

In urban studies, density particularly relates to humans' usage of space (e.g. via residence and employment) and is one of the most important indicators for urban expansion measurement (e.g. urban sprawl, fragmentation, segregation). However, this research reveals there are some different characteristics in relation to urban segregation in the context of Thai towns which needs more specific data collection and measurement in order to capture it. Four common characteristics of spatial segregation found in the case study towns could be related to the impacts of globalisation during the process of urban development. They were 1) Lack of diversity in public land use, 2) Discontinuity of urban growth, 3) Low levels of spatial accessibility and connectivity and 4) Imbalance between physical development and public usage. Characteristics of modern developments in developing/transitional areas are often dispersed and segregated, and may lead to environmental and social problems (Vaughan, 2005; Harvey, 2003; Sennett, 1990).

There were two aspects that are problematic. The first is that for t Thailand's (modern) development policies were road-oriented and promoted the usage of cars and motorcycles from the 1970s which led to particular styles of rapid urban expansion. The national political economic and development policies altered rural Thai communities in relation to spatial expansion and connectivity. These policies encouraged the increase of

tarmacked roads, the availability of Japanese motorcycles and the development of public transport through bus services between rural areas and town centres (Christopher and Phongpaichit, 2005). New development centres/sub-centres of the case study towns were linear and nodal settlements and more dispersed than the historic centres which all had a compact grid pattern. In accordance with the rapid urban expansion in these transitional areas and without appropriate planning policy, the spatial structure of new development areas such as new sub-centres/modern shopping areas showed low degrees of connectivity to other parts of the town, and low intelligibility. A lack of diversity in public land use was also found due to loose provincial and local regulation of planning policy (e.g. density, land use/zoning), and also because modern and new development sub-centres were often developed for specific purposes or activities of particular user groups (e.g. factory, government office, shopping mall).

The socio-spatial processes of urban development alter urban land uses and the lives of people living within these towns and cities. Globalisation is viewed as influencing the shape and form of modern retail development (Ingersoll, 2006; Mui et al., 2003) which is often dominated by capitalism leading to increasing inequalities in society (Smith, 2008; Harvey, 2003; Dennis, 2008). The nature of modern trade influences urban public land use. These projects often are developed with some security in terms of guards or fences and limitations on accessibility for the general public. They tend to be physically and socially segregated from other parts of the town, known as gated-community. In the case of NAK town centre, some parts of public roads were claimed for private use, whereas the modern style shopping mall denied public accessibility and welcomed only its customers by using CCTV, security guards and parking space fees which are uncommon in provincial Thai towns. In the context of the case study towns, modern

retail developments such as shopping centres and exclusive businesses encouraged socio-spatial segregation. Even some of the self-contained state-owned projects, such as the military based camps and academic institutions, were found spatially segregated to some extent. In addition, some urban public spaces were also found to be limiting public accessibility in ways similar to gated communities, such as the waterfront public park in NAK and water recreation park in ANG.

These developments are evidence of increasing spatial segregation in relation to the current social, political and economic context of Thai towns. It is possible to critique planning policies and practices in urban development for generating increased spatial and social segregation. Localism and local culture has become an important influence within the transforming Thai society since the beginning of 1980s (Christopher and Phongpaichit, 2005). The urban conflicts linking to social injustice and inequalities have been blamed on the uneven implementation of government policies, for example. There have been many protests about the impact of modern trade penetration on local retailers and the relocation or clearance of existing urban facilities and community resources in rural and provincial towns. This issue is discussed further in Chapter 7.

DISCUSSION

This chapter has continued the study of the spatial configuration by focusing on sub-centres or out-of-town development areas and addressed the second research question: What are the characteristics of urban expansion in relation to retail area development in provincial towns, and does it show any features of spatial segregation in the different contexts? The analysis involved the three sets of indicator and measurement of physical and spatial segregation in relation to socio-spatial and political economic dimensions.

Considering the physical and spatial segregation together, it could be concluded that spatial segregation in a provincial town context refers to areas difficult to access, with limited connection to other parts of the town and an imbalance between the density of public space usage and physical development. The common characteristics of segregation in urban development are: 1) lack of diversity in public land use, 2) discontinuity of urban growth, 3) low levels of spatial accessibility and connectivity and 4) an imbalance between physical development and public usage.

This research identifies that specific spatial data collection, measurement and analysis in provincial Thai towns can reveal the characteristics and socio-spatial processes that are leading to increasing urban segregation. The findings of big differences between OSR and Compactness meant that there are more imbalances of physical urban development and actual usage by the public of the same area. Therefore the places such as gated communities, luxury residential units and modern retail malls with security and surveillance including limitations on public accessibility tended to be physically and socially segregated from other parts of the town. The findings in this chapter also suggested that the 'big difference' between OSR and Compactness as spatial segregation indicators is a way of capturing these changes, especially in the areas of rapid urban growth with limited data available, such as small-to-medium size provincial towns including towns in the context of global South.

At this point, the study has found different degrees of spatial segregation in the case study areas which are linked to social and political economy. High degrees of spatial segregation have been detected in the new area developments with gated community characteristic such as factories and self-contained urban developments including modern shopping areas. Shifting urban land use connected to the globalisation of retail

trade can rapidly bring about spatial segregation which may be accompanied by increased social inequalities and possible social conflict. The issues of injustice and uneven urban development have been linked to inappropriate policies and practices which may worsen the social conflicts in the context of global South (Roy 2005; Watson (2005). The literature review has suggested that segregated urban space strongly links to social segregation which could bring about social conflicts owing to inequalities (Harvey, 2003, Vaughan, 2005, Kozak, 2008). Therefore, further evidence concerning the social impact of spatially segregated retail developments in urban areas is needed and will be addressed in Chapter 8. The next chapter addresses the third research question in relation to the life cycles of retail areas in provincial Thai towns.

CHAPTER 7

THE LIFE CYCLE OF RETAIL AREA DEVELOPMENTS IN PROVINCIAL THAI TOWNS

INTRODUCTION

This chapter focuses on the process and trends of socio-spatial development of the main retail areas of the case study towns, in order to address the third research question: How have new retail developments affected the spatial properties of the main retail areas and led to the decline of older retail areas? Firstly, the researcher developed physical indicators to identify the characteristics of retail area development in the case study sites. Secondly, the spatial properties were used as the main indicators to measure levels of accessibility and the success and decline of the retail areas. Therefore, data used for the first set of indicators were developed from the fieldwork observations of the built environment and retail patterns in different periods of retail development in 2011, including the post observation survey which was conducted on January 2013. The second set of indicators was taken from the spatial configuration analysis using space syntax. The analysis sections of this chapter link to certain periods of retail area development. Finally, social and political economic aspects relating to the process of retail area development were analysed in order to address the impact of globalisation in the provincial case study towns.

This chapter consists of five sections followed by a discussion: 1) Physical development and periods of change of retail areas, 2) Spatial configuration analysis of retail areas, 3) Life cycles of retail area development in provincial towns, 4) Spatial properties of

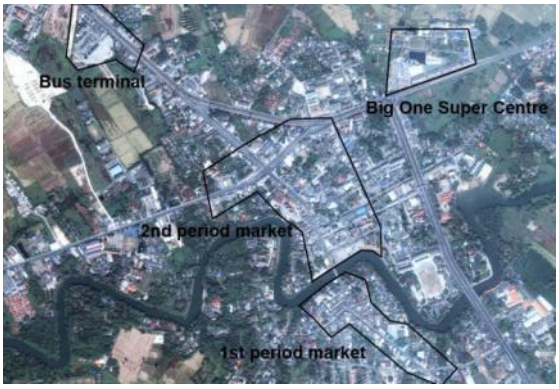
decline and success in retail areas, 5) Social and political economic aspects relating to the process of retail area development and 6) Discussion.

PHYSICAL DEVELOPMENT AND PERIODS OF CHANGE OF RETAIL AREAS

The analysis of data from on-site observations mainly considered the differences in location and specific characteristics (see Figure 7.1 and 7.2) of major retail area developments. This research initially classified retail area developments into three main periods, as analysed in Chapter 5 (see Figure 7.3), which were the first-period or old retail area, the second-period or Popular Market retail area and the third-period retail area of modern trade retailing.

This chapter considers the retail characteristics of each development area by using the physical indicators that link to economic activities and retail activities as seen in Table 7.1, including: 1) number of wet market buildings, parking lots and vacant land, 2) proportions of buildings being closed down, or being used for other purposes, 3) ratios of trade types which are traditional or local trade, wholesale trade and modern trade and 4) conditions of buildings by using a scale of building condition which has five levels (Appendix I).

Figure 7.1 Retail locations by periods of development, on base maps adapted from aerial photographs, 2011 (source: GoogleEarth)



Nakhon Nayok

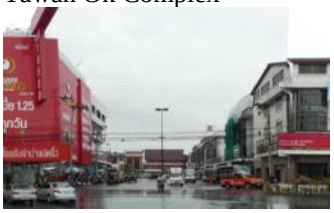
Ang Thong

Chachoengsao

Figure 7.2 Retail areas in different periods of development

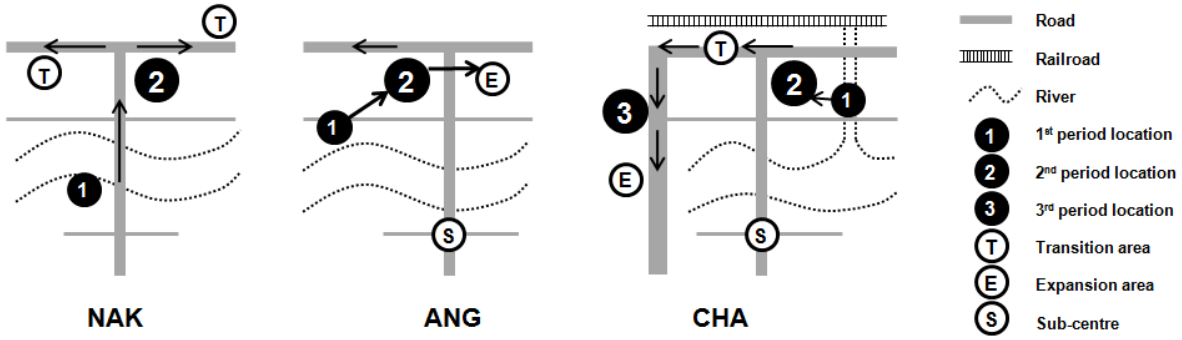
Case	First-period	Second-period	Third-period
NAK	 Old port area  Wang Sakrajaom Market	 Tetsaban Market	 Retail strip in front of out-of-town Bus Terminal Big One Centre [12]

[12] Transition development

Case	First-period	Second-period	Third-period
ANG	 1st CPB[13] Market (replaced after fires)	 Suwaphan Market  Tetsaban 2 Market	 Agricultural Market[14]
CHA	 1st CPB[2] Market  Old-style shophouses  Kuakoon Market	 Bobua Market  2nd CPB[2] Market  1st Bus Terminal Market[15]  Tawanok Plaza Department Store	 Mahajakkapat retail strip  Tawan Ok Complex[16]  Out-of-town Bus Terminal Market  Multinational shopping centre and discount store

[13] Crown Property Bureau
[14] Expansion development
[15] after redevelopment
[16] Out-of-town shopping centre

Figure 7.3 The process of town centre development



The Development of the First-Period Retail Areas

Analyses of the observation survey and maps initially identified the first-period retail development as typically characterised by riverside or canal settlement. The waterway accessibility suggested that the only effective mode of transport and communication of the period was by boat during this period. The oldest retail areas, originating from before the 1960s, typically consisted of a single-storey small wet market building on a vacant space surrounded by old-style commercial buildings known as shophouses. These mixed residential and commercial units were mostly constructed with semi-permanent materials such as wood panels and sheet metal roofs. Old ports were also found in the retail areas of Nakhon Nayok and Chachoengsao, but neither a port nor a first main market building was found in Ang Thong. However, a closed down derelict concrete-structure building was found next to the oldest retail site with some rows of wooden shophouses. These had replaced the older one which had been completely destroyed by fires.

Table 7.1 shows that the first-period retail areas of the three towns had shared retail characteristics. From the building-usage survey and GIS database of 3,594 units in the three cases (with further details of observation surveys in Appendix D), the majority of

shops were those of small-scale local retailers, and wholesalers made up only 6-7% of premises. The conditions of buildings were at the level of fair to poor (C to D), although the old retail area of Ang Thong was ranked as poor to very poor (D to E) and also had the least availability of shops when compared to the other areas of the same period. More than half of the commercial buildings were turned into residential units (66%), which made the first-period retail area of Ang Thong the most declined in terms of economic activity. Whereas in Nakhon Nayok there were the highest ratios of active shops (59%) when compared to the first- period retail areas of the other two case study towns.

Table 7.1 Observation surveys of Physical Development and Retail Patterns by Period[17]

	Number of	NAK			ANG			CHA			
		1st	2nd	T3rd	1st	2nd	E3rd	1st	2nd	T3rd	3rd
	Wet market	1	1	0	0	3	1	1	3	1	0
	Parking lots	3	4	1	0	6	13	0	4	5	6
	Vacant land	1	1	0	3	0	2	0	1	2	1
	Closed building	20	9	15	10	10	8	18	14	17	2
	House	21	10	19	66	28	42	36	20	5	18
	Commercial	59	81	66	24	62	50	46	66	78	80
Trade type	Local	92	88	94	90	85	70	93	94	85	78
	Modern	1	10	4	3	7	9	1	4	14	22
	Wholesale	7	2	2	7	8	21	6	2	1	0
Building condition	A	1	7	12	1	6	8	0	3	7	21
	B	12	25	22	11	15	24	6	16	31	49
	C	54	55	55	40	61	55	58	66	52	28
	D	27	12	11	36	18	13	31	14	9	2
	E	6	1	0	12	0	0	5	1	1	0

[17] Further details of observation surveys in Appendix D

The Development of the Second-Period Retail Areas

In the second-period, the main retail areas were surrounded by newer shophouses, expanded from the first-period retail area as clearly evident in Ang Thong and Chachoengsao. In each case, the main retail area was located between the first-period retail area and the bridge which links both sides of the river (previously mentioned in Chapter 5). Unlike the others, in Nakhon Nayok the second-period retail area was established on the opposite side of the river to the first-period retail area (see Figure 7.3).

The second period retail areas were developed during the 1970s-1980s, in which concrete shophouses enclosed the wet market building and the first central bus terminal. It was the most typical pattern of development of main retail areas in provincial towns in Thailand and could be called the 'Popular Market' *(Talaad Samai Niyom).*

Recently there have been increasing limitations in relation to car parking and car access in general caused by less available space in the densely developed retail areas. The number of wet market buildings was determined by the scale of the district and the population density. For example, Chachoengsao had developed four wet market buildings and a department store in the same period and in close proximity to one another - Bobua Market, First Bus Terminal Market, New CPB (Crown Property Bureau) Market and CPB-First Bus Terminal Market, and Tawanok Plaza which was the first (and fully air-conditioned) local department store in the province. Ang Thong had three wet market buildings in the second-period retail area, which were Tetsaban 1 and 2 Wet Markets, Suwaphan Wet Market. In smaller towns there were fewer wet market buildings such as (Tetsaban Market) in Nakhon Nayok.

Table 7.1 shows that the second-period retail areas of the three towns mainly consisted of local retailers with some limited modern trade retailing: Nakhon Nayok 10%, Ang Thong 7%, and Chachoengsao 4%. Nakhon Nayok had the highest ratios of active retailers (81%), followed by Chachoengsao (66%) and Ang Thong (62%). Ang Thong had the highest rate of wholesalers (8%) when compared to other case study towns, and most buildings were in fair condition (C level). Building conditions in Nakhon Nayok were the highest ranked at good to very good (A to B). Chachoengsao had the highest rate of closed down buildings compared with the other two towns, whereas Ang Thong had the highest rate of residential buildings. The second-period retail area of Nakhon Nayok had the highest number of buildings with commercial functions (81%).

The Development of the Third-Period Retail Area

Each of the case study towns had a different degree of development particularly between the second-and third-period retail areas. In Nakhon Nayok, the out-of-town bus terminal and government office cluster nearby (without connecting to each other) were developed along the highway on the west side of the town. On the east side, the Big One Centre was later established and located approximately a 15 minute walk away from the second-period retail area. This shopping venue seemed to operate in a similar way to a modern supermarket, with an air-conditioned main building, newly built shophouses and a multipurpose vacant space for occasional concerts and fairs, as well as having a highway location. In fact, the Big One Centre is a local business with a local retailing management style despite its large size, and differs from international modern retailers, such as Tesco (known as Tesco-Lotus in Thailand) and Big-C. Consequently, both areas were classified as ‘transition areas’, represented as T3rd in Table 7.1. In Ang Thong, the most recent period retail area was Suwaphan Agricultural Market with the majority of

shops being local retailers (70%). This retail area has situated at the opposite side of the road to the second-period retail development. Therefore, the newly developed area in Ang Thong was identified in this research as an ‘expansion area’ and represented as E3rd.

Figure 7.4 Blocking point by gated land usage and overcrossing that separates retail areas of Mahajakkapat Road from the second-period retail area in Chachoengsao

Similar to Nakhon Nayok, the Chachoengsao case also has a ‘transition area’. The Mahajakkapat retail strip was once a low-density development area sprawling from the second-period retail area. It was later densely developed with shophouses and has recently become a successful commercial area. However, the reasons why the area was not classified as an expansion period, was that the retail strip on the Mahajakkapat Road was not continued from the previous retail area due to the gated land use of the high school and government offices and the road bridge across the river making a barrier in between these retail areas (see Figure 7.4). In addition, the area was developed in a linear settlement of shophouses without a wet market building - the main element of the second-period retail development.

Chachoengsao differed from the other cases, owing to the development of out-of-town modern trade retailing. The third-period retail development started with the relocation of the central bus terminal to the highway on the west side of town. On the south side, in the same period, there was also the first establishment of an out-of-town shopping centre and hotel (called Complex Junction), which were owned and run by local private investors. Unlike the other retail periods, it did not have an active wet market building as a centre of economic activity. On the contrary the modern trade businesses, particularly large-scale modern retailing operated by multinational companies, were the main features of this area. Newly built shophouses have also emerged on the roadside in front of the modern shopping centre, clustered at the main entrance.

Figure 7.5 Vacant plots for temporary markets near the third-period retail areas

Vacant plots acting as temporary market locate near out-of-town bus terminal in NAK (left) and near local government office cluster in ANG (right)

The entrance to outdoor Sanam Muay Market, with stalls and vendors operated two days a week on a vacant plot behind the shophouses on the Tepkunakorn Road, CHA

It should also be noted that, at the beginning of the 2000s, there was a boom of car boot sales (*Talaad Nud* or 'Appointed Market'), which still continue to be widely popular and well received by people from all walks of life. The large multipurpose vacant space with car parking might be used as a temporary market on certain days of the week, and was normally found in the third-period retail area. For example, vacant plots stand next to the out-of-town government offices in Nakhon Nayok and Ang Thong, and *Sanam Muay* (Boxing Stadium) temporary market in Chachoengsao (Figure 7.5).

Looking at Table 7.1, the observation surveys also revealed that the new development areas had a variety of retail activities. Nakhon Nayok's transition area had local retailing of over 90%, the transition area of Chachoengsao about 85%, the third-period retail area of Chachoengsao about 87% and the expansion area of Ang Thong about 70%. For modern retailing, the third-period retail area in Chachoengsao had the highest number (22%), followed by the transition area in Chachoengsao (14%), expansion area in Ang Thong (9%) and transition area in Nakhon Nayok (4%). It should be noted that all the new development areas had a very small number of wholesale traders, except for the expansion area of Ang Thong, which had about 20% of wholesale premises. These surrounding retail buildings generally have more storeys than those in the former periods. Most of the new development areas had similar buildings, except for the third-period retail area in Chachoengsao, which had higher numbers of good to very good building condition and lower numbers of unused buildings when compared to other areas. Differing from the others, the expansion area of Ang Thong had the highest rate of residential units and only half of the area was actively used for commercial purposes.

The observation data clearly revealed the physical decay, which was related to economic decline in the first and second period retail areas. The first-period retail area

was the most affected with over half of the overall buildings in the area turned into low-income houses. Second-period retail areas were still active in trading but with obvious physical decay in many areas. These periods in Nakhon Nayok and Ang Thong had the highest numbers of active commercial buildings at 81% and 62% respectively. Meanwhile the transition (78%) and third-period retail areas (80%) in Chachoengsao were in new and good condition with the highest numbers of active retailers in the area.

SPATIAL CONFIGURATION OF RETAIL AREAS

This section focuses on the spatial analysis of the retail areas developed in different periods. The spatial properties which were used for analysis, consist of mean depth, Local Integration (R-local), Global Integration (Rn), Intelligibility (Int) and Synergy (Syn). The Integration value identifies the levels of accessibility, which in this research implies the most accessible area linked to the ‘spatial centrality’ or the ‘Integration core’ of the towns.

The First-Period Retail Area Development

From Table 7.2, in 1973 the first-period retail area locations of Nakhon Nayok and Ang Thong districts had the best levels of accessibility, which meant that these two locations were the main areas for retail activities in the town centres at the time.

Table 7.2 Spatial properties of the first-period retail area locations

Location/Year	R-local	Rn	Int	Syn
NAK 1973	**R4**			
District	1.3572	1.0291	0.3304	0.7938
1st retail area	2.2558	1.5623	0.8969	0.9905
2nd retail area	1.9267	1.4086	0.8305	0.9593
Transition area	1.9254	1.4052	0.1628	0.7221
ANG 1973	**R3**			
District	1.3969	0.9883	0.3202	0.7364
1st retail area	2.4064	1.5043	0.9033	0.9058
2nd retail area	2.1163	1.3708	0.7791	0.9764
Expansion area	2.2436	1.353	0.8173	0.9819
CHA 1973	**R4**			
District	1.4812	1.1437	0.1739	0.7482
1st retail area	1.8584	1.2414	0.4379	0.6393
2nd retail area	1.6899	1.2794	0.7265	0.9487
3rd retail area	0.8823	0.8761	0.6286	0.8964
Transition area	1.9412	1.3962	0.2386	0.9242

The first-period retail area of Nakhon Nayok had Local Integration (R4) at 2.2558 and Global Integration (Rn) at 1.5623. Ang Thong's first-period retail location had Integration at 2.4064 at a local level (R3) and 1.5043 at the global level (Rn). In Chachoengsao in terms of accessibility levels there was another important active district, the transition area, which had higher Integration at both local and global levels. The first-period retail location had Local Integration (R4) of 1.8584 and a Global Integration of 1.2414, whereas the transition area had a Local Integration of 1.9412 and Global Integration of 1.3962. This means that the most accessible location of the district in 1973 was on the Mahajakkapat Road – the transition area.

The first-period retail areas of Nakhon Nayok (0.8969) and Ang Thong (0.9033) had the highest degrees of Intelligibility when compared to the retail locations of the following periods. The Intelligibility suggested that the spatial networks of the first-period retail areas in both cases were not complicated, which means that the users could easily

understand and memorise the routes. In terms of Synergy, the first-period retail location of Nakhon Nayok showed the highest degree at 0.9905 whereas Ang Thong's first-period retail location was at 0.9058. However, the second-period and expansion retail locations had the highest degrees of Synergy at 0.9764 and 0.9819 respectively. These relatively high degrees suggest that the road networks of the second-period and expansion retail areas were connecting with other parts of the town as well or even better than the first-period retail location (especially in the case of Ang Thong).

It was clearly seen in the case of Chachoengsao that in 1973 the second-period retail location had the highest degree of both Intelligibility (0.7265) and Synergy (0.9487). This relates to the analysis of Chapter 5, which found that the retail and market periods of Chachoengsao had been developed earlier and were more complicated than the other case study towns. There was supporting evidence in terms of secondary data and spatial configuration as described below.

The Integration core of Chachoengsao town in 1973 was linked to the location of the second-period and transition area rather than the first-period location. The early second-period retail area began at Bobua Market, which was established in the late 1950s and was the first wet market building that was not built on the riverfront or by the canal. It developed at the same time as the railway with a railway station within the area which was a popular transport node at the time. In other words, 1973 was the year that marked a declining period of the first-period retail area. The first-period location had low levels of accessibility, and a low degree of Intelligibility (0.4379) as well as Synergy (0.6393). This means the area's spatial network was poorly linked with other areas of the town.

The Second-Period Retail Area Development

Owing to the limitations of the secondary data; the government agencies' lack of standard formats and systems of storing information, the spatial configuration analysis used available data from 1997 (Nakhon Nayok), 1993 (Ang Thong), and 1990 (Chachoengsao). These years were initially considered to be the second-period of retail area development. It could be noted, from the previous first-period retail area analysis, that the 1970s were actually the beginning of the second-period development in Chachoengsao.

Table 7.3 Spatial properties of the second-period retail area locations

Location/Year	R-local	Rn	Int	Syn
NAK 1997	**R4**			
District	1.4101	1.0672	0.298	0.7276
1st retail area	1.6649	1.2741	0.6255	0.8737
2nd retail area	2.1768	1.583	0.6598	0.962
Transition area	1.4111	1.1246	0.4468	0.8817
ANG 1993	**R5**			
District	1.2938	0.8556	0.1118	0.4623
1st retail area	1.3759	0.7597	0.3718	0.6819
2nd retail area	1.8312	1.1443	0.5256	0.9177
Expansion area	1.6301	1.0771	0.4507	0.9718
CHA 1990	**R4**			
District	1.5684	1.1868	0.1673	0.7298
1st retail area	1.6932	1.1279	0.5402	0.7033
2nd retail area	2.0212	1.3785	0.6433	0.8146
3rd retail area	1.6633	1.2226	0.2207	0.793
Transition area	1.7924	1.3775	0.2459	0.9021

Nakhon Nayok and Ang Thong had similar trends of spatial configuration changes during the 1990s. The first-period retail areas had significantly lost their importance in terms of Integration in the core of the towns to the second-period retail areas. As shown in the Table 7.3, both Local and Global Integration of the second-period retail areas were higher than other locations. The accessibility levels of Nakhon Nayok's second-

period location were 2.1768 at local (R4) and 1.5830 at global (Rn) whereas Ang Thong was 1.8312 at local (R5) and 1.1443 at global level (Rn). These two retail locations also had the highest degree of Intelligibility at 0.6598 (Nakhon Nayok) and 0.5256 (Ang Thong). However, they differed in Synergy, in which the second-period location of Nakhon Nayok remained the highest ranked at 0.9620. However, the location of the expansion retail area (0.9718) had a better connection with other parts of Ang Thong town, compared with the second-period location (0.9177).

The second-period retail area of Chachoengsao maintained the highest levels, at both Local (R4: 2.0212) and Global (Rn: 1.3785) Integration in 1990. The transition retail area on the Mahajakkapat road also had the highest levels of accessibility at a global level (Rn: 1.3775). This implies that these two locations had remained the most accessible areas in the district since 1973. Intelligibility of the second-period location was higher than others at 0.6433. However, the transition area had the best Synergy at 0.9021 whereas the second-period had been 0.8146. Consequently, the second-period retail location had continued to gain importance especially in terms of accessibility and Intelligibility from the 1970s to the beginning of the 1990s, as revealed from the spatial analysis. Simultaneously, one location which had gained more importance was the transition area on Mahajakkapat Road.

The Third-Period Retail Area Development

Table 7.4 Spatial properties of the third-period retail area locations

Location/Year	R-local	Rn	Int	Syn
NAK 2011	**R5**			
District	1.3276	1.0139	0.1465	0.6061
1st retail area	1.6748	1.2457	0.5363	0.8031
2nd retail area	1.8708	1.4187	0.7548	0.9032
Transition area	1.8056	1.3739	0.5279	0.9749
ANG 2011	**R6**			
District	1.2101	0.7865	0.0679	0.3185
1st retail area	1.4202	0.8323	0.1518	0.2481
2nd retail area	1.6883	1.1078	0.5587	0.922
Expansion area	1.736	1.1282	0.6810	0.9155
CHA 2011	**R9**			
District	1.0142	0.685	0.0405	0.4019
1st retail area	1.1519	0.7686	0.4302	0.6612
2nd retail area	1.2483	0.8124	0.6956	0.8215
3rd retail area	1.5893	1.0402	0.3669	0.8905
Transition area	1.2905	0.8925	0.1159	0.4836

The most recent spatial properties as provided in Table 7.4 show that the third-period location had gained more importance in terms of accessibility, Intelligibility and Synergy. Nonetheless the three cases exhibited different levels of development in the same (third) period.

The spatial properties of 2011 revealed that the second-period retail location in Nakhon Nayok had retained the highest levels of accessibility (Local Integration: 1.8708 and Global Integration: 1.4187) since the 1990s. In addition, the area also had the highest degree of Intelligibility at 0.7548 and the second highest degree of Synergy at 0.9032. Compared to other retail locations of the same town, the transition retail area had become an important location in terms of accessibility (Local Integration: 1.8056, Global Integration: 1.3739) and Synergy (0.9749). In the case of Ang Thong, the

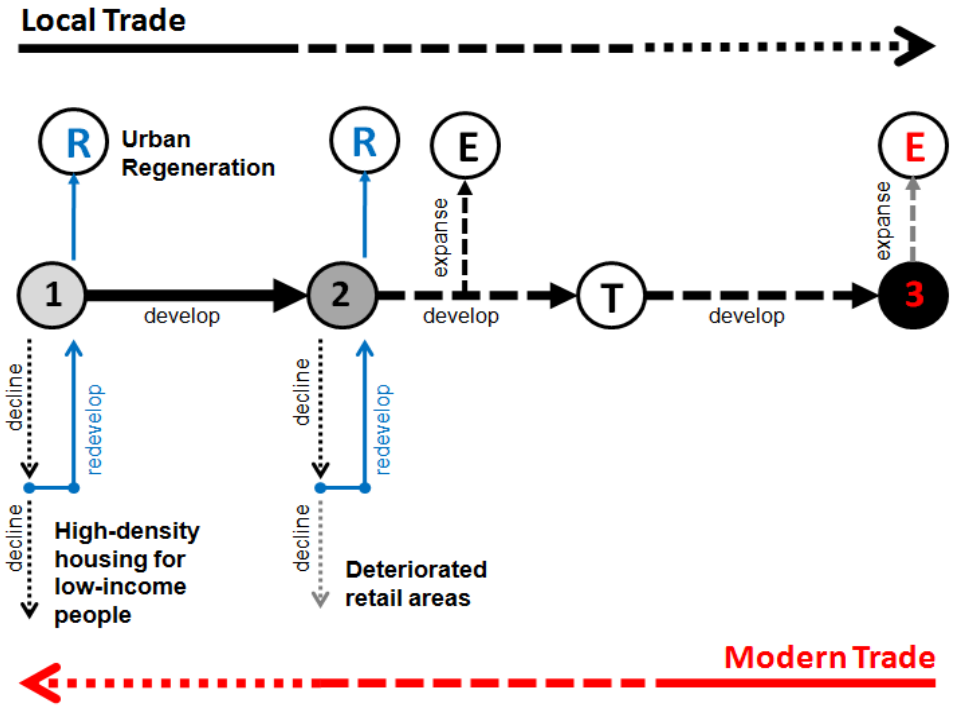
expansion area had become the most accessible area with Local Integration at 1.7360 and Global Integration at 1.1282. It also had the highest degree of Intelligibility (0.6810) and Synergy (0.9155). Compared to the second-period's spatial properties, there was only a slight difference between these two areas due to their proximity in terms of location.

Apparently the third-period retail area of Chachoengsao had the most accessible location, both at local (1.5893) and global (1.0402) levels. With Synergy at 0.8905, this modern trade retail area had the best spatial network connection to other parts of the town. Differing from the other spatial properties, Intelligibility of the third-period retail (0.3669) and transition (0.1159) areas were rather low compared with other retail locations. This means that the spatial network of these areas was difficult for users to understand.

LIFE CYCLE OF RETAIL AREA DEVELOPMENT IN PROVINCIAL TOWNS

The first section of this chapter explained how there were different properties of retail area development among the case study towns, which can be summarised in Figure 7.6. Numbers 1 to 3 represent the period of retail area. E is the expansion retail area, T is the transition area and R represents the urban regeneration/redevelopment.

Figure 7.6 Life cycle of retail area development



Old Retail Areas; Decline and Regeneration Periods

Starting from the first-period retail areas (number 1), from observation surveys (see Table 7.1), the retail areas with ports were mostly abandoned and generally decayed. The building condition survey also revealed that these areas had the highest rate of derelict buildings (Figure 7.7), which were 33% in Nakhon Nayok, 48% in Ang Thong, and 36% in Chachoengsao. In addition, the areas had been changed into high-density low-income residential areas. There were the highest rate of closed down buildings and shops/shophouses which were 41% in Nakhon Nayok, 76% in Ang Thong, and 54% in Chachoengsao. Chachoengsao's first-period retail area still had the dilapidated structures of old wooden shophouses, the port and included a wet market building of the first Crown Property Bureau (CPB) Market with rumours of its pending renovation for tourism. Another old main market building - Kuakoon Market, which was developed at the same period but was rebuilt after fires at the beginning of the 1970s, was partially

used as storage. The majority of shops (over 90%) were those of small-scale local retailers while modern retailing was the lowest found.

Figure 7.7 Areas of the Riverfront

Deteriorated buildings in the first-period retail areas, CHA (left) and ANG (right)

The second-period retail area developments (number 2) of Ang Thong and Chachoengsao were developed within walking distance from the first-period retail areas. Differing from the others, Nakhon Nayok's second-period retail area was located on the opposite side of the river, in which the main retail area was developed on the main road or further away from the riverside. The retail areas of this period were mainly local retailing (85 - 94%) with little modern retailing (4 -10%). The areas had developed in a dense grid-pattern of settlement with a high density of population that had numerous problems such as traffic congestion and conflicts over land usage. Even though the retail areas of this period were still actively trading, some areas had been completely abandoned. From the observation survey of building conditions, 62% (Ang Thong) and 66% (Chachoengsao) were active commercial buildings in these second-period retail areas. In Nakhon Nayok, 81% of buildings in the area were in average to good physical condition. This evidence could link to the Nakhon Nayok's spatial

analysis, in which the second-period retail area has retained its importance as an Integration core of the town.

Urban Regeneration; Recent Redevelopment in the Provincial Towns

The post observation survey in early 2013 revealed some significant changes in the case study sites, with important redevelopment projects in the old markets of Chachoengsao and Ang Thong (Figure 7.8). The wet market buildings of the second-period market areas were demolished and rebuilt for the same commercial functions, unlike the first-period's buildings which had become derelict. At the same time, some of the surrounding shophouses in the wet market areas had been refurbished and had newly painted facades such as the Crown Property Bureau properties in Chachoengsao. This is an indicator of ongoing regeneration of inner town centres in the near future, especially in the case of Chachoengsao. On the contrary, the trend of modern trade development penetrating the town centre was still very low in the case of Ang Thong. Very few multinational franchises and modern brand retailers had adapted the existing shophouses and commercial buildings in the town centre area. Thus the wet market redevelopment projects suggested that the second-period market still largely maintains its economic importance as a centre of commercial activities. Judging from these recent trends, it is thus possible to conclude that a peripheral modern trade development area may not arise in the near future in the case of Ang Thong.

Figure 7.8 Regeneration projects in the old retail areas in CHA and ANG

Demolition of wet market in the old bus terminal in CHA; before (left) and after (right)

Refurbishment of CPB shophouses in CHA

Demolition of 2nd period market in ANG

New riverfront landscape improvement historic shophouses adapted for other uses By the private sector in CHA; before (left) and after (right)

Redeveloped private parking lot from the derelict site of an old cinema in CHA; before (left) and after (right)

There were also other redevelopment projects occurring in several deteriorated areas of the first and second-period retail areas of Chachoengsao. Two derelict sites that used to be vacant grounds of two old cinemas demolished in the 1980s were recently developed into a large parking lot and waterfront promenade with restaurants in historic settings. Both had not been present in the old retail areas before. The parking lot development addressed the shortage of car parking space in the wet market areas of the old town centre, and its private investment and management with fencing and parking fee charges (which is uncommon in the context of provincial Thai towns) suggested that the economic activities of the areas are still vibrant. However, the large concrete open space also signals that the landlord (CPB) could have waited for other kinds of investment and new development projects to replace it. The controlled access to the site has created a lack of open space that otherwise could have been used as a public space. Instead it has generated spatial segregation that could trigger conflicts among the community members like the case of the second-period retail area of Nakhon Nayok, in which the neighbours/retailers protested a major landlord's redevelopment project of a modern discount store.

Diversity of the New Retail Area Development

In Figure 7.6, new retail areas had been developed in diverse ways and locations after the second-period retail area reached its peak in the 1980s. The first pattern found in Ang Thong town was the 'expansion area', which was located within walking distance of the previous retail area and was developed specifically as an agricultural market. From observation data, Ang Thong's expansion area had 9% of modern trade retailers, which was similar to the rate found in the second-period area at 7%. Secondly, the 'transition area' in Nakhon Nayok and Chachoengsao towns had the characteristics of

main road-accessible locations near the existing town centres (the second-period retail area) with various modern trade retailers in the area. Nakhon Nayok had only 4% of modern retailing in the transition area but 10% in the second-period retail area. In another case, Chachoengsao's transition area had about 14% of modern retailers in the area, which was the second highest of the town after the out-of-town new built areas. The transition area of Nakhon Nayok had a higher degree of modern trade development, similar to in Chachoengsao, because of their settlement patterns and spatial properties.

Figure 7.9 Newly built large franchised retailers in CHA

HomePro **Thai Watsadu**

Source: http://www.thaibusinesspr.com

The most recent development pattern found only in Chachoengsao town was the third-period retail area, which this research referred to as the 'modern trade' period. Considering the type of retailing from observation data, there was a relationship between the retail-period and the number of modern retailers, as the later the period the higher the percentage of modern retailers. The third-period retail area had 22% of small-to-large-scale modern trade retailers; the highest rate found among the case study towns. The post observation survey in early 2013 showed that the third period retail area had been growing and rapidly sprawling further in different directions along the same

highway. There were two newly built large franchised retailers of construction materials and home decoration – HomePro and Thai Watsadu (Figure 7.9).

THE SPATIAL PROPERTIES OF DECLINE AND SUCCESS IN THE RETAIL AREAS

Table 7.5 Trends of spatial properties in each period of retail development

First-period retail area	Phase	R-local	R-global	Int	Syn
NAK	1973 to 1997	-0.5909	-0.2882	-0.2714	-0.1168
	1997 to 2011	+0.0099	-0.0284	-0.0892	-0.0706
ANG	1973 to 1993	-1.0305	-0.7446	-0.5315	-0.2239
	1993 to 2011	+0.0443	+0.0726	-0.2200	+0.4338
CHA	1973 to 1990	-0.1652	-0.1135	+0.1023	+0.0640
	1990 to 2011	-0.5413	-0.3593	-0.1100	+0.0421
Second-period retail area					
NAK	1973 to 1997	+0.2501	+0.1744	-0.1707	+0.0027
	1997 to 2011	-0.3060	-0.1643	+0.0950	-0.0588
ANG	1973 to 1993	-0.2851	-0.2265	-0.2535	-0.0587
	1993 to 2011	-0.1429	-0.0365	+0.0331	+0.0043
CHA	1973 to 1990	+0.3313	+0.0991	-0.0832	-0.1341
	1990 to 2011	-0.7729	-0.5661	+0.0523	+0.0069
Third-period retail area					
NAK – Transition	1973 to 1997	-0.5143	-0.2806	+0.2840	+0.1596
	1997 to 2011	+0.3945	+0.2493	+0.0811	+0.0932
ANG – Expansion	1973 to 1993	-0.6135	-0.2759	-0.3666	-0.0101
	1993 to 2011	+0.1059	+0.0511	+0.2303	-0.0563
CHA – Transition	1973 to 1990	-0.1488	-0.0187	+0.0073	-0.0221
	1990 to 2011	-0.5019	-0.4850	-0.1300	-0.4185
CHA - Modern trade	1973 to 1990	+0.7810	+0.3465	-0.4079	-0.1034
	1990 to 2011	-0.0740	-0.1824	+0.1462	+0.0975

The chronological changes in spatial properties of different period retail areas reveal various patterns as shown in Table 7.5. For ease of interpretation this section analyses

the ‘differences of spatial properties’ in two phases of change, which are ‘early phase’ (from 1973 to the 1990s) and ‘later phase’ (from the 1990s to 2011).

The analysis of the trends of spatial properties in the first-period retail areas revealed signs of significant recession in both phases, with the exception of Ang Thong which had slightly increased Integration at both local (+0.0443) and global (+0.0726) levels, as well as Synergy which improved the differences by 0.4338. This might infer that after 1993 the first-period retail area of Ang Thong had slightly higher levels of accessibility and its spatial road network had more connection with and integration into the town’s road network. In Chachoengsao’s old retail area, despite its continuing decreased levels of accessibility, there were improved degrees of Intelligibility (+0.1023) and Synergy (+0.0640) in the early phase, and of Synergy in the later phase (+0.0421).

The patterns of spatial properties of the second-period retail areas reveal three different trends in retail area development. The first trend was the decreased spatial properties in the early phase, which increased in the later phase. This pattern was found in the second-period retail areas of Nakhon Nayok and Chachoengsao. An interpretation could be that these retail areas were very successful between 1973 and the 1990s as they had become the town centres replacing the first-period retail areas. In the later phase (from 1990s to 2011), these retail areas declined in terms of accessibility levels or lost their importance to the newer developed third-period retail areas. The second trend was found in Ang Thong, representing the decline in accessibility levels, particularly at the early phase of change. The last trend was identified with a shared characteristic of the later phase - of changes in spatial properties in all the three cases. The feature was not only the decline in levels of accessibility of the main retail areas after the 1990s, but

also the slightly increased degrees of Intelligibility and Synergy, particularly obvious in Ang Thong (+0.0331 and +0.0043) and Chachoengsao (+0.0523 and +0.0069).

Even though the first and second-period retail areas declined, redevelopment projects had recently taken place in Ang Thong and Chachoengsao. These regeneration areas had similar characteristics. The pattern was that on one hand all redeveloped areas showed declining levels of accessibility while on the other hand Intelligibility and Synergy had increased slightly in the regeneration time period. The improvements in spatial network could be interpreted to mean that the users found it easier to understand and navigate when travelling in the areas. In addition, the spatial road networks of the regenerated areas were better connected to the town's road network than in the past.

There were three trends occurring in the third-period retail development. Firstly, the spatial properties of the prior phase went down and then rose again in the later phase. This pattern was found in the transition area of Nakhon Nayok and expansion area of Ang Thong. Both areas had declined in terms of accessibility levels between 1973 and the 1990s and then improved. Secondly, compared to other retail areas, the transition area of Chachoengsao had retained its high scores in spatial properties since early development – with similar scores in the main retail area/town centre of the time. However, considering contextual changes from the different years, this area tends to decline gradually in terms of levels of accessibility especially after the 1990s. One reason was the emerging third-period, which was developed on the adjacent bypass road. Another reason was the limitation to urban growth from the railway lines that caused the area to develop in a linear pattern. Finally, in the third-period location of Chachoengsao there were increasing levels of accessibility (local level: +0.7810 and global level: +0.3465) at the first phase, which contrasted with a decrease in

Intelligibility (-0.4079) and Synergy (-0.1034). At the later phase, there was a slight decline of accessibility levels (local level: -0.0740 and global level: -0.1824) with higher Intelligibility (+0.1462) and Synergy (+0.0975). Even though this trend showed the continuing decline of accessibility levels of the third-period retail areas, the Integration of the area still had the highest degree compared to the other locations.

SOCIAL AND POLITICAL ECONOMIC ASPECTS RELATING TO THE PROCESS OF RETAIL AREA DEVELOPMENT

This study reveals the relationship between the political economy and the life cycle of retail area development in the case study towns. Nakhon Nayok exemplifies the types of social conflicts among local retailers who were against the penetration of modern trade of a modern discount store in Nakhon Nayok province. In this case, the owner of an inner city plot with shophouses and some vacant land did not extend the leases with the current tenants, because Tesco Lotus Express had showed its interest and agreement to a long term lease and contract. The tenants with other local retailers protested in 2010 until the municipal office intervened and proposed negotiations. The incident ended with the withdrawal of Tesco Lotus Express, however in 2011 the location was fully refurbished into a small shopping centre. The owner had partitioned the rental space into smaller lots with private security and a fenced parking lot with fee charges and controlled entry gate where formerly there had been a free shared public entrance to adjacent shops and vendors. This upset the neighbouring retailers, as their customers found little free parking even along the public road. Nonetheless multinational modern retailers proceeded with their plan with even bigger scale. During the 2013 post observation, Tesco Lotus had constructed a retail store on a plot opposite to the Big One

Centre on the bypass road. This evidence supports the spatial properties analysis which pointed out there was high level of accessibility in the transition area of Nakhon Nayok.

In Ang Thong case, the retail area analysis in this chapter and Chapter 8 suggested the strongest local retailing proficiency as compared to the other two sites. The newly emerged retail area was identified as the expansion of the second-period retail area. Its specific purpose was to become the centre of agricultural produce relating to the economic development policy that focused on strengthening local trade. Three factors supporting the action were: 1) A provincial development policy to become a regional centre for agricultural distribution, 2) A strong provincial retailers' association, and 3) A leading local politician, currently a mayor of the municipal area, who has expanded the family construction business to retailing and trade. The family currently owns the two most successful private markets which are Suwaphan (Wet) Market in the second-period retail area and Suwaphan Agricultural Market in the expansion retail area.

Chachoengsao was the most diverse in terms of retail area development, as compared to the other two cases. The survey and secondary data indicated that its emergence of new retail areas was related to the changing modes of transport which were a result of urban development policy. The origin of the first non-waterfront market, Bor Bua Market, was that its establishment aimed to support the then newly operated inner city and market area's at the central train station. Until the 1970s, Chachoengsao was a major cargo station serving the eastern railway line, but later the market station was closed and relocated to the new central station on Mahajakkapat Road further from the crowded inner city area. Wider roads such as Mahajakkapat were significant for the increased of linear retail developments. The origin of modern retail development was in accordance with the provincial development policy to relocate the central bus terminal away from

the town centre. At the beginning of the 1990s, the new commercial centre with bus terminal was first operated at the then edge of town on the junction of a major highway and end of Mahajakkapat Road. The project was unsuccessful in terms of trading because of its out of town location, particularly in the two-storey roofed wet market building and its surrounding shophouses which were only partially occupied. Recently a new cluster of multinational modern retailers spread along this highway so that the project finally became part of the main modern trade area of the town.

The evidence of recent urban regeneration projects in some old retail areas, with specific improvement of patterns of the spatial properties, has revealed a new trend of redevelopment in old retail areas. This trend reflected the influence of locality and tourism in historic areas of provincial towns. Since the beginning of the 2000s, there has been an increase in locally based tourism and, consequently, urban regeneration to many areas of provincial towns in Thailand, such as the case of urban conservation in Phuket Old Town (see Horayangkura, 2005). These successful urban regeneration projects were usually initiated by educational institutions or NGOs in cooperation with local people rather than by central or local government (ScholarSpace, 2007, Techaratpong, 2014). However, many regeneration projects were not concerned with safeguarding traditional values and thus brought about conflicts in land usage, such as the spread of multinational modern retailers into many town centres. In the three case study towns, number of protests took place during this research study. The protests showed the local peoples' concerns about protecting the strength of their businesses and the local economy. On the other hand, it reflected the weaknesses of planning policy in these provincial towns as well as the lack of authority and flexibility at the local level to

develop appropriate administrative support and regulation (e.g. Pattana-Anek, 2000; Glassman and Sneddon, 2003; Usavagovitwong, 2012).

DISCUSSION

The diverse and dynamic processes and trends of socio-spatial development of the main retail areas in provincial Thai towns were revealed by the measurement of spatial properties and physical development linked to the spatial political economy in this research. The analysis found various phases of retail area development in the case study towns that could be conceptualised as life cycles of retail areas. The levels of accessibility were a significant indicator to define the success and decline of economic centres. On the one hand, some locations that had once been successful as main economic centres for a period eventually declined. On the other hand, the new locations had gained higher degrees of accessibility and finally replaced the older ones over time. The consideration was not only on decline through accessibility levels, noticeably inferior to other locations, but also on the low degrees of Intelligibility and Synergy which eventually decreased over time. The socio-spatial process of retail area development and redevelopment as observed in this study was closely linked to the emergence of modern trade development. It could be implied that the emerging new retail developments had led to the decline of older retail areas. Spatial configuration analysis could illustrate the transition and expansion phases in modern periods, including the stages of decline, success and redevelopment in retail area development.

The political economy has affected the pattern of retail area development, which has been closely linked to the global retail trade. In the first-and second-period, the retail area developments of the three towns shared common characteristics, but over time

there has been an increase in diversity and complexity in the third-period retail areas such as many types of temporary market, and the transition and extension of modern trade retail areas. In addition, the process of retail area development has been closely linked to the political economic context of each town and its surrounding areas. There was evidence of tension between the interests of local retailers and global retailers and landowners. The protests of local retailers against multinational modern trade were part of "public participation" and action for social justice particularly in rural communities and provincial area of Thailand (Baker and Phongpaichit, 2005. The increased diversity of retail developments also had characteristics of increased inequalities and social and economic segregation.

In this study, the protest by local retailers in relation to Tesco Lotus was resolved in the short term by negotiation with the municipality, but did not prevent a later development on the same site that curtailed local trade. In the context of the global South which Thailand is part of, management policies for resolving urban development issues have been critiqued as inappropriate and out of date (e.g. Pattana-Anek, 2000; Glassman and Sneddon, 2003; Usavagovitwong, 2012) and unable to respond to rapid transformation which is part of globalisation. The expansion of global retail trade at the expense of local retailers could also lead to increased inequality and urban justice problems (Parnell and Robinson, 2012).

Extending the life cycle of old retail areas by improving their physical condition or changing their functions was one of the most recent popular models in urban planning. However, this urban development policy requires community consultation and participation to be effective. In these Thai case study towns in the global South context modern urban development policy was unable to solve these existing problems.

Examples of this failure were the slum clearance and redevelopment as a fenced, unsuccessful and rarely occupied public park in Nakhon Nayok, and the model of the multi-storey wet market building in many towns.

The issue is further discussed in Chapter 8, in relation to retail behaviour addressing the fourth research question.

CHAPTER 8

SPATIAL BEHAVIOUR PATTERNS IN RETAIL AREAS

INTRODUCTION

This chapter addresses the fourth research question: How have differences in the spatial and physical characteristics of retail area developments influenced the retail behaviour patterns of users? This fourth research question aimed to interpret and generalise the different characteristics of retail patterns among retail areas that originated from different periods of development.

To answer this question, the spatial configuration related to human behaviour in terms of public space usage was analysed using three main measurements, and presented in three sections in this chapter. They were 1) Retail patterns in different periods of retail development, 2) Spatial behavioural patterns in retail areas and 3) Spatial segregation in relation to political economy of the provincial town context. The first section is the study of current retail areas focusing on: 1) retailing patterns, 2) movement patterns and 3) interactions in the main public spaces of retail areas. The second section links spatial configuration properties to retail patterns, focusing on: 1) the importance of movement patterns and socio-economic interactions in retail public spaces and 2) specific characteristics of travel and transport in provincial town centres. The third section is about spatial segregation in relation to the political economy of the provincial town context, by focusing on 1) differences in socio-economic status of retail area users, 2) spatial segregation and conflicts in society and 3) urban development policies in relation to spatial segregation. There is a critical discussion at the end of the chapter.

The behavioural data collection methods consisted of structured field observations and a questionnaire survey. The observations of traffic movements and social activities in public spaces were carried out by the researcher and four research assistants in all the case study sites, as explained in Chapter 3.

RETAIL PATTERNS IN DIFFERENT PERIODS OF RETAIL DEVELOPMENT

Retail patterns were analysed from the questionnaire survey, from the total 446 responses in the three provincial town centres (further detail in Chapter 3). The retail patterns in this research are comprised of three different elements: 1) retail patterns, 2) movement patterns and 3) interactions in the main public spaces of the retail areas. The cases were classified according to the periods of retail area development, similar to the method used in the previous chapters. Therefore, the first and second-period retail areas (usually represented as 1^{st} and 2^{nd} in data tables) consisted of the old retail areas from all three provinces, whereas the new development period was divided into three sub-groups, which were the transition area of Nakhon Nayok (T), expansion area of Ang Thong (E) and the modern trade retail area of Chachoengsao (3^{rd}).

Retail Patterns

The survey explored five aspects of retail patterns in the different areas, which were: 1) types of products and services being sold, 2) frequency of shopping and average spend per week, 3) reasons for shopping; 4) time spent and 5) travel mode and distance from home to the market or retail area.

Products and services

Table 8.1 Kinds of shopping, types of products and services

	1st		2nd		T		E		3rd	
	N	%	N	%	N	%	N	%	N	%
Subsistence	21.0	16.7	67.7	20.1	39.0	15.0	15.7	12.3	57.9	18.7
Fun	37.7	29.7	134.3	34.3	69.3	24.7	49.3	32.7	105.8	29.4
Goal	56.3	42.0	149.7	38.3	150.3	55.7	75.0	47.3	174.6	47.4
Products	55.3	42.3	165.3	44.0	98.0	36.0	53.7	35.0	142.1	41.7
Services	59.7	49.0	186.3	48.7	160.7	59.3	86.3	57.3	196.1	53.9
Difference		6.7		4.7		23.3		22.3		12.2

As set out in Chapter 3, three types of shopping were identified - subsistence shopping (i.e. grocery and fresh foods), fun shopping (i.e. restaurant, clothes, health and beauty, jewellery, and leisure services), and goal shopping (specified purpose such as telecommunication, home construction, agricultural and occupational equipment, religion and belief, bank and private services). Table 8.1 presents the results from questionnaires (Appendix E) showing that in the new development areas (T, E, 3rd) there were a higher number of respondents who shopped for goals: 55.7% in the transition area of Nakhon Nayok, 47.3% in the expansion area of Ang Thong, and 47.4% in the third-period retail area of Chachoengsao. In the second-period retail areas there was a mixture of all three with the highest percentages relating to shopping for fun (at 34.3% compared to other retail areas). There was also a big difference between the shops providing products and those providing services in the new development retail areas.

Frequency of and average spend on shopping

Table 8.2 Frequency of shopping trips per week and average spending[18] on shopping

	1st		2nd		T		E		3rd	
	N	%	N	%	N	%	N	%	N	%
Shopping visits per week										
Day or less per week	17	20.24	57	30.16	15	38.46	17	20.48	24	47.06
2-3 days a week	28	33.33	57	30.16	12	30.77	24	28.92	12	23.53
4-5 days a week	20	23.81	23	12.17	8	20.51	22	26.51	7	13.73
Every day	19	22.62	51	26.98	4	10.26	18	21.69	7	13.73
Average spending per visit										
0-100 (0-2 GBP)	18	21.43	13	6.88	10	25.64	12	14.46	10	19.61
101-500 (2-10GBP)	40	47.62	101	53.44	19	48.72	36	43.37	12	23.53
501-1,000 (10-20GBP)	8	9.52	41	21.69	6	15.38	18	21.69	13	25.49
1,001-2,000 (20-40GBP)	12	14.29	11	5.82	2	5.13	10	12.05	13	25.49
2,001-5,000 (40-100GBP)	6	7.14	12	6.35	2	5.13	7	8.43	2	3.92
More than 5,001 (more than 100 GBP)	0	0	10	5.29	0	0	0	0	0	0

Table 8.2 shows that there were differences in frequency of shopping in the different types of retail areas. The largest group of respondents (33.33%) went shopping two to three days a week in the first-period retail areas. The majority of respondents (60.32%) usually visited the second-period retail areas less than three days a week. The percentage of respondents who preferred shopping in the new retail areas of Nakhon Nayok and Chachoengsao were found visiting only once or less within a week. In the Ang Thong expansion area there was a wide range with shopping being done from rarely to every day. It should be noted that these new areas and the first-period retail areas had the highest frequency of customers shopping at 48% and 46% respectively, i.e. more than four days a week.

For one off visits, the first-period retail areas ranked the highest frequency (69.05%) with maximum spending of 500 Baht (10 GBP), which was the lowest range of spending. In the second-period retail areas (75%) and Ang Thong expansion area (65%)

[18] Exchange rate of year 2011, 50 Baht was 1GBP (www.moneysupermarket.com)

the average spend was between 100-500 Baht (2-10 GBP). However, some customers of the second-period retail areas (5.29%) could spend over 5,000 Baht (100 GBP), and this high level of spend was not found anywhere else. In the transition area of Nakhon Nayok, the majority of respondents (48.72%) spent 100-500 Baht (2-10 GBP), whereas Chachoengsao third-period retail area had the greatest spending (51%) at 500-2,000 Baht (10-40 GBP). It should be noted here that in the old retail areas the average spend was relatively low despite frequent visits; whereas in the new development areas, the spending was high but less frequently visited.

Reasons for shopping

Table 8.3 Reasons for Shopping

	1st		2nd		T		E		3rd	
	N	%	N	%	N	%	N	%	N	%
Reasons for shopping										
Variety of goods	27	32.14	57	30.16	5	12.82	35	42.17	28	54.90
Good quality	14	16.67	21	11.11	0	0	14	16.87	11	21.57
Price	13	15.48	42	22.22	2	5.13	6	7.23	12	23.53
Negotiable	13	15.48	25	13.23	0	0	2	2.41	1	1.96
Modern style of management	1	1.19	3	1.59	0	0	1	1.20	18	35.29
Place (clean & neat)	2	2.38	3	1.59	0	0	1	1.20	11	21.57
Walk& select goods yourself	10	11.90	22	11.64	0	0	6	7.23	13	25.49
Relation with the retailer	37	44.05	38	20.11	12	10.77	11	13.25	8	15.69
Easy to access	50	59.52	61	32.28	34	87.18	17	20.48	25	49.02
Car parking available	19	22.62	7	3.70	6	15.38	5	6.02	23	45.10
Close to school, work place, etc.	25	29.76	71	37.57	2	5.13	42	50.60	26	50.98
Other reasons	2	2.38	8	4.23	1	2.56	6	7.23	0	0
Product	19	19	42	30	2	9	19	37	18	21
Management	21	22	23	16	4	19	9	17	43	51
Relationship	34	35	43	30	8	28	9	17	6	7
Accessibility	23	24	34	24	10	44	15	29	18	21

Table 8.3 shows that respondents in the first-period retail area indicated that 'Relationship' (i.e. between customer and seller) was the most common reason for their shopping (35%), followed by Accessibility (24%) and Management (22%), having similar percentages and the lowest score was for the Quality or Variety of 'Products' (19%). In the second-period retail area, the responses showed that both the Product and Relationship had similar high percentages (30% each), followed by Accessibility (24%) and Management (16%). Comparing the new development areas of the three case study sites, the respondents' answers suggested that the transition area of Nakhon Nayok was distinctive in its highly rated Accessibility (44%), while the expansion area of Ang Thong was highly rated for Product (37%) and the third-period retail area of Chachoengsao for its Management (51%). The attraction of old retail areas was the relationships between traders and customers, but poor management and accessibility were some of the main obstacles. This contrasted with the new retail area developments where there was better management and accessibility but more social distance between consumers and retailers.

Time spent shopping

Table 8.4 Time consuming on shopping from questionnaires survey

	1st		**2nd**		**T**		**E**		**3rd**	
	N	%	N	%	N	%	N	%	N	%
Up to15mins.	22	26.19	34	17.99	1	2.56	5	6.02	1	1.96
15 to 30mins.	27	32.14	75	39.68	22	56.41	31	37.35	10	19.61
30 to 60mins.	25	29.76	47	24.87	14	35.90	41	49.40	27	52.94
1 to 2 hrs.	7	8.33	19	10.05	2	5.13	4	4.82	13	25.49
More than 2 hrs.	3	3.57	10	5.29	0	0	2	2.41	0	3.2

Most respondents from the first-period (62%), second-period (65%) and transition area of Nakhon Nayok (56.4%) spent between 15 and 60 minutes shopping (Table 8.4).

However, respondents took the longest time for shopping in the modern retail area of Chachoengsao (3rd), which took around an hour and also had the highest proportion of over-an-hour shoppers (28.7%) when compared with all the cases. A similar pattern was followed by the second-period retail area (15.3%). Conversely, the first-period retail area was the area with shortest time spent on shopping (less than 15 minutes: 26.2%). Shopping often took little time with the visits being mostly frequent and quick, whereas in the new retail area developments customers were spending over half an hour per visit on fun and goal shopping.

Mode and time of transport, and distance from home to retail area

Table 8.5 Mode of transport

	1st		2nd		T		E		3rd	
	N	%	N	%	N	%	N	%	N	%
Mode of transporting										
Taxi, motorcycle service, Tuktuk	3	3	8	4	2	5	7	8	6	11
Personal car	28	30	66	33	17	41	29	35	25	46
Motorcycle	38	41	82	41	13	32	36	43	18	33
Bicycle	5	5	2	1	0	0	0	0	0	0
Walking	18	19	23	12	6	15	3	4	3	6
Non-vehicle	23	24	25	13	6	15	3	4	3	6
Vehicle	69	74	156	78	32	78	72	86	49	90
Public transport	2	2	18	9	3	7	8	10	2	4

All of the retail areas shared the same modes of transport (Table 8.5). The majority of respondents used cars and motorcycles. The first-period retail area (41%), second-period retail area (41%) and expansion area of Ang Thong (43%) had the highest percentages of motorcycle usage. Meanwhile the areas with the highest percentages of personal car usage were the transition area of Nakhon Nayok (41%) and modern trade area in Chachoengsao (46%). The use of public transport was mostly found in the

second-period retail area and expansion area of Ang Thong (10%), which was still significantly lower when compared with other vehicle usages (i.e. taxi, motorcycle taxi, car, and motorcycle) despite being located near the out-of-town central bus station (particularly in the new development areas of Nakhon Nayok and Chachoengsao). The new development areas of the three case study towns had higher usage of motor vehicles than other retail periods. In Chachoengsao's third-period retail area, the proportion of motor vehicle usage was 90%.

Considering the movement rates of personal cars and motorcycles it should be noted that the highest rates of motorcycle usage were found in the older period retail areas (41%) and the expansion retail area of Ang Thong (43%). While the highest rates of personal car usage were found in the modern shopping area of Chachoengsao (46%) and the transition retail area of Nakhon Nayok (41%).

Table 8.6 Distance from home to retail area

	1st		2nd		T		E		3rd	
	N	%	N	%	N	%	N	%	N	%
Distance from home to retail area										
Up to 1 km	26	31	47	24.9	7	17.9	9	13.8	4	7.8
1 to 5	30	35.7	47	24.9	17	43.6	30	36.1	21	41.2
5.1 to10	13	15.5	39	20.6	10	25.6	20	24.1	17	33.3
Over 10 km	15	17.9	56	29.6	5	12.8	24	25.9	9	17.6
Mean [19] (km)		6.1		9.3		5. 6		8.6		13.4
Maximum (km)		30		80		16		35		160
Minimum (km)		0.1		0.1		0.5		0.5		0.8

[19] calculated by excluding minimum and maximum value

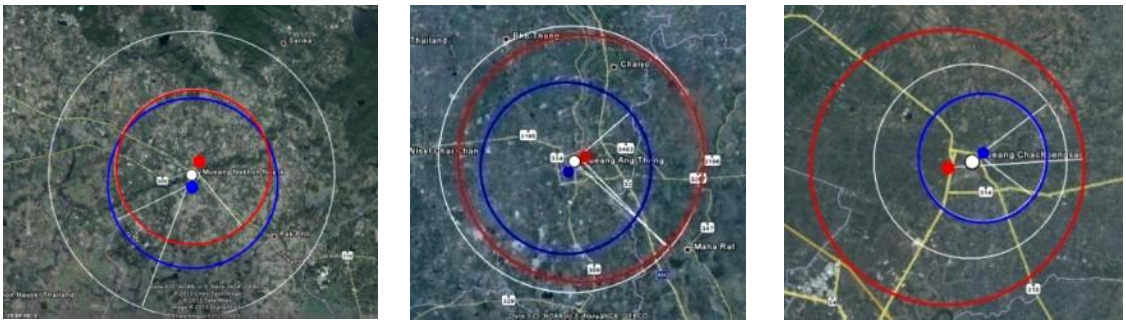
Table 8.7 Statistical correlation between Time from home to market and Distance from home to market

		Time from home to market	Distance from home to market
Time from home to market	Pearson Correlation	1	.837(**)
	Sig. (2-tailed)		.000
	N	446	442
Distance from home to market	Pearson Correlation	.837(**)	1
	Sig. (2-tailed)	.000	
	N	442	442

** Correlation is significant at the 0.01 level (2-tailed).

Distance and time from home to retail areas (Table 8.6), according to respondents' perceptions, suggested significant correlation at 0.837 (**) between the two variables (Table 8.7). This implies interchange ability between these two variables in the analysis, in which either using time or distance the results would be the same. In the following behavioural patterns analysis, distance was therefore used as an influencing factor and divided into 4 groups which were: lower than 1 km, 1 km to 5 km, 5.1 km to 10 km, and over 10 km.

Figure 8.1 Commuting distances of consumers of different period retail areas



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In Figure 8.1, the blue radius is the first-period retail area's commuting distance; the white radius is the second-period's commuting distance; and the red radius is the new

development's commuting distance. The first and second-retail areas' radius used the statistical calculated mean of each period's commuting distance. Considering the mean of each retail period (see Figure 8.1), the longest average distance that the customers travelled was from their home to the third-period retail area of Chachoengsao (13.4 km), second-period retail area (9.3 km), expansion area of Ang Thong (8.6 km), first-period retail area (6.1 km), and transition area of Nakhon Nayok (5.6 km) respectively. It should be noted that in the third-period retail area of Chachoengsao the longest distance from the customer's home was 160 km, whereas in the transition area of Nakhon Nayok, which is also a new development area had a longest distance of only 16 km - the shortest distance amongst responses from all the case study sites. Proximity and motorcycle use were linked and this is an important aspect of transport and travel pertinent to the global South and will be discussed in more detail in the next subsections of Movement Patterns and Specific Characteristics of Travelling and Transport in Provincial Town Centres in this chapter.

Retail patterns were measured by five indicators: 1) types of products and services, 2) frequency of purchase and average spend per week, 3) reasons for shopping, 4) time spent and 5) mode and distance from home to market or retail area. These not only reflected the characteristics of each retail area but also linked to economic activities and retail structures, which differed according to the period of retail area development. The analysis of consumer behaviour showed the diversity and differences between old and new retail areas and also among new development areas, supporting the idea of three phases of new development: transition, extension, and modern trade development.

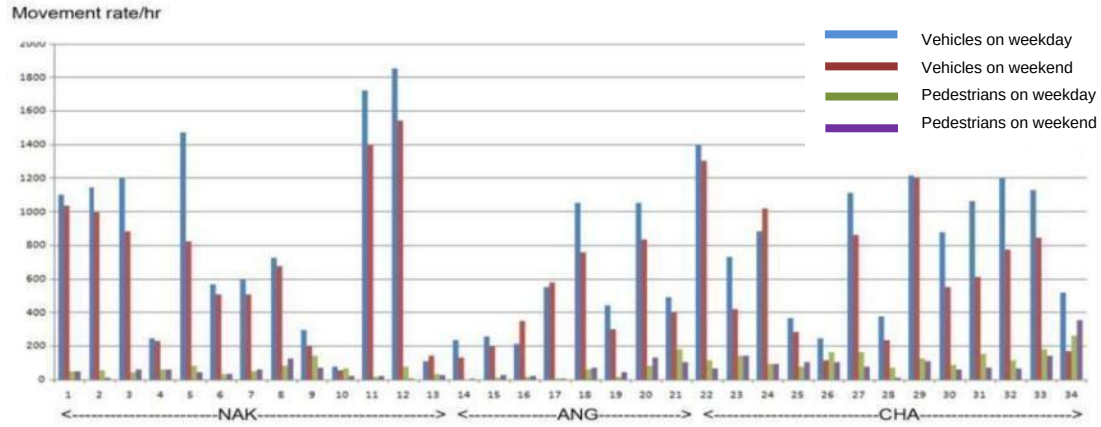
Movement Patterns

The previous analysis chapters concluded that the most common feature of market or retail areas of all periods was the mode of transport and logistics. The first-period retail locations were situated on the riverfront. During the early 1980s, where modernisation and road construction shaped trading and logistics and thus affected the overall socio-economic conditions of developing towns, public transport in the form of buses and trains, became very important while private cars were still unaffordable. The first central bus station was built adjacent to the existing town centre (the second-period retail area), which meant the area became the most prosperous commercial district of the 1980s. Nowadays, the major mode of transport is through the use of private cars. The locations of modern trade centres were strategically planned to avoid the problems of inner city areas, such as dense traffic, lack of space and connectivity limitations. They were developed on conveniently accessible sites connecting to important roads between towns.

The movement patterns in each location of the retail areas were analysed by using gate observation data from fieldwork observations (further results of observation in Appendix F). Movement data of traffic volume included the types of pedestrian – i.e. children, adults, and elderly people, and vehicle – i.e. bicycle, motorcycle, personal car, public bus, and service vehicle, as suggested by An Advanced Tutorial in Axman Software Manual (Dalton, 1997) (further detail of data collection in Observation survey of traffic and retail behavioural patterns in Chapter 3).

First-period Retail Areas

Figure 8.2 Movement rates at each observation gate of the first-period retail areas



From the survey of pedestrian and vehicle movement (Figure 8.2) at the first-period retail area in Nakhon Nayok, the top three most crowded spots with the highest vehicle movement rates were Gate 12 (1,698 unit/hour), Gate 11 (1,563 unit/hour) and Gate 5 (1,146 unit/hour). For pedestrian movement, the highest three were Gate 9 (108 unit/hour), Gate 8 (105 unit/hour) and Gate 5 (63 unit/hour) respectively. The route that was more equally used by both vehicles and people was the cluster of shophouses adjacent to the main road that led to the bridge (Gates 9, 10, 13). The average vehicle and pedestrian movement rates were higher on weekdays than weekends.

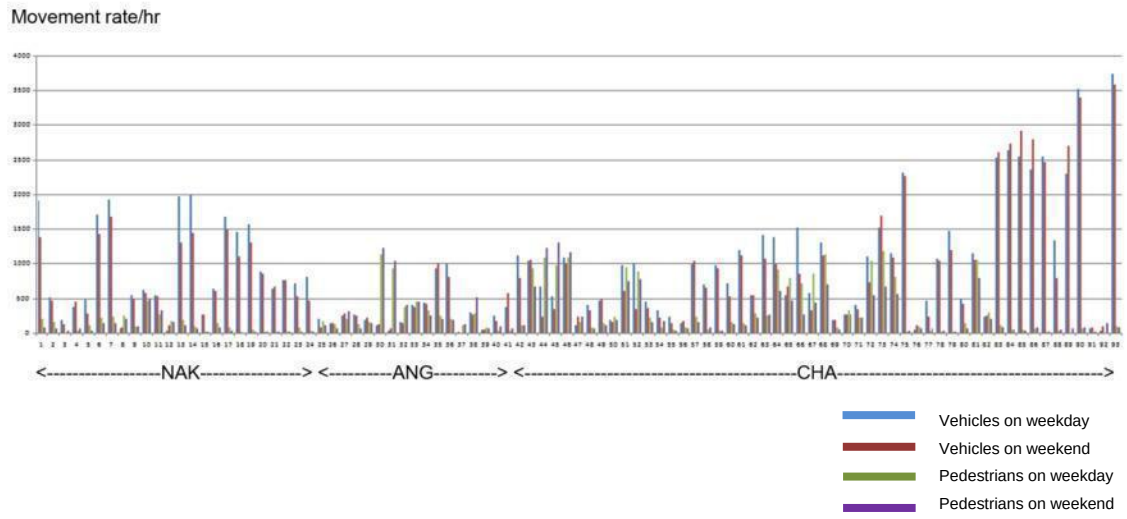
In Ang Thong, the movement pattern also had significantly higher rates of vehicles than pedestrians. However, the only area which had the similar amount of both vehicle and pedestrian movements was the Tetsaban main junction – the transport node of the town centre. The three gates with the highest rates of vehicle movement were Gate 9 (942 unit/hour), Gate 5 (903 unit/hour) and Gate 4 (564 unit/hour). The three gates with the highest rates of pedestrian movement were at Gate 10 (141 unit/hour), Gate 9 (108

unit/hour) and Gate 5 (66 unit/hour). The average amount of vehicle usage on weekdays was higher than weekends but the pedestrian movements on weekends were higher than weekdays.

In Chachoengsao, the first period market had the highest rates of pedestrian movement and vehicle usage. The only areas that had similar rates between vehicles and pedestrians were the route towards Kua Koon Market and Wannaying Community (Gate 4 and Gate 5), which were relatively old declining commercial areas situated on the other side of a canal to Bor Bua Wet Market. The three areas with the highest vehicle movement rates were Gate 1 (1,353 unit/hour), Gate 8 (1,212 unit/hour), Gate 12 and Gate 13 (987 unit/hour). The three areas with the highest pedestrian movement rates were Gate 15 (309 unit/hour), Gate13 (162 unit/hour) and Gate12 (144 unit/hour). The average amounts of vehicles and pedestrians on weekdays were higher than weekends.

Second-period Retail Areas

Figure 8.3 Movement rates of the second-period retail areas



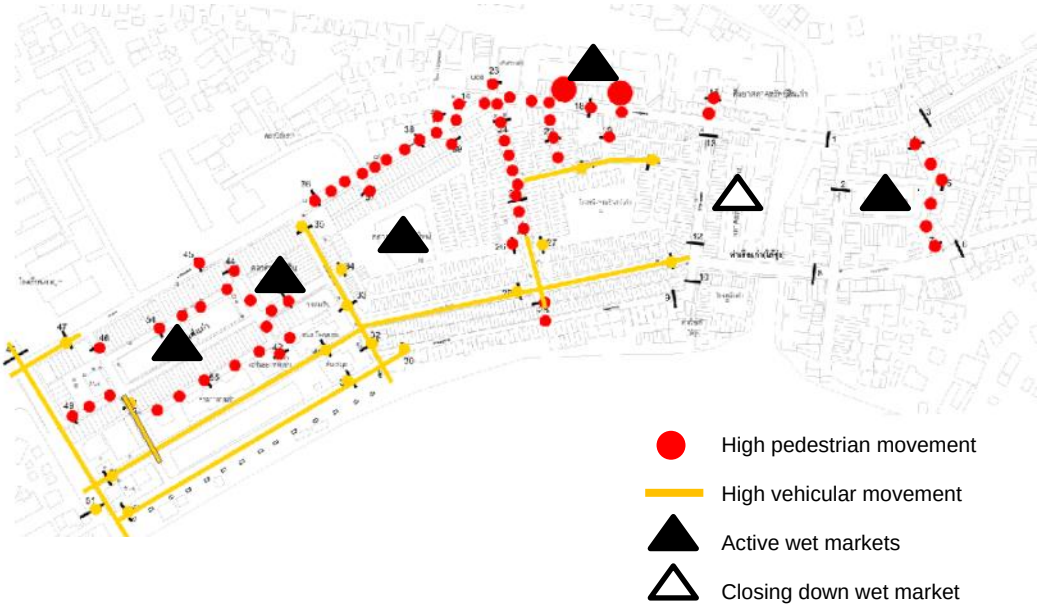
Vehicles on weekday
Vehicles on weekend
Pedestrians on weekday
Pedestrians on weekend

The movement patterns of Nakhon Nayok's second-period retail area can be divided into two groups (Figure 8.3). First, the routes with vehicles as the main form of movement had very different rates between vehicle and pedestrian movements such as on the Suwannasorn Road, the main road connecting both sides of the river. The three locations with the highest vehicle movement rates were Gate 21 (1,806 unit/hour), Gate 28 (1,725 unit/hour) and Gate 15 (1,647 unit/hour). Another group were the routes with relatively similar rates between vehicle and pedestrian movements. They were the inner roads (next and parallel to the waterfront road), which were Gate numbers 16, 17, 19; the road in front of the second-period wet market and the road in front of the high-density community adjacent to the second-period wet market. The three locations with highest pedestrian movements were Gates 24, 25 and 22. Both vehicular and pedestrian movement rates of weekdays were higher than weekends, except for the public open space on the riverfront and the entrance of main wet market building, which had higher movement rates on weekends than on weekdays. Such areas were centres for people to gather during weekends.

Most routes in Ang Thong's second-period retail area were clearly pedestrian-based including the entrances and roads that circled the three wet market buildings. Only Tetsaban 7 Road (Gate 19, 20) and the entrance to the parking lots of Suwaphan wet markets (Gate numbers 27, 28) had higher vehicle movement rates. Both vehicle and pedestrian movement rates did not differ markedly between weekdays and weekends. The areas with high movement rates on weekends were the second-period wet markets and the surroundings. The three spots with the highest vehicle movement rates were Gates 19 (981 unit/hour), 20 (915 unit/hour), 28 (477 unit/hour). The three spots with

the highest pedestrian rates were Gates 14 (1,185 unit/hour), 15 (984 unit/hour) and 17 (459 unit/hour).

Figure 8.4 Movement patterns in the second-period retail area of CHA



In Chachoengsao, the movement patterns could be divided into two groups; vehicle-based movement as represented by yellow lines and pedestrian-based movement as represented by red dots in Figure 8.4. The pedestrian-based areas were the Chumphon Road in front of Bor Bua wet market (about 50 metres in length) and the road that circled the old central bus station market. Although both areas were not very far apart, they were blocked by Santirat Road, which had eight times higher vehicle movement rates than Chumphon Road. The three spots with the highest rates of vehicle movement were Gates 67 (3,663 unit/hour), 64 (3,468 unit/hour) and 58 (2,733 unit/hour). The spots with the highest rates of pedestrian movement were Gates 16 (1,161 unit/hour), 17 (1,140 unit/hour) and 18 (1,134 unit/hour). The movement rates of both groups were higher on weekdays, except for the areas in front of Bor Bua wet market, the entrance to the New CPB wet market (Gate 26), the Chumphon Road in front of the police station

and the Mahajakkapat Road in front of the school, which had high movement rates at the weekends.

Third-period Retail Areas

Figure 8.5 Movement rates in the third-period retail areas

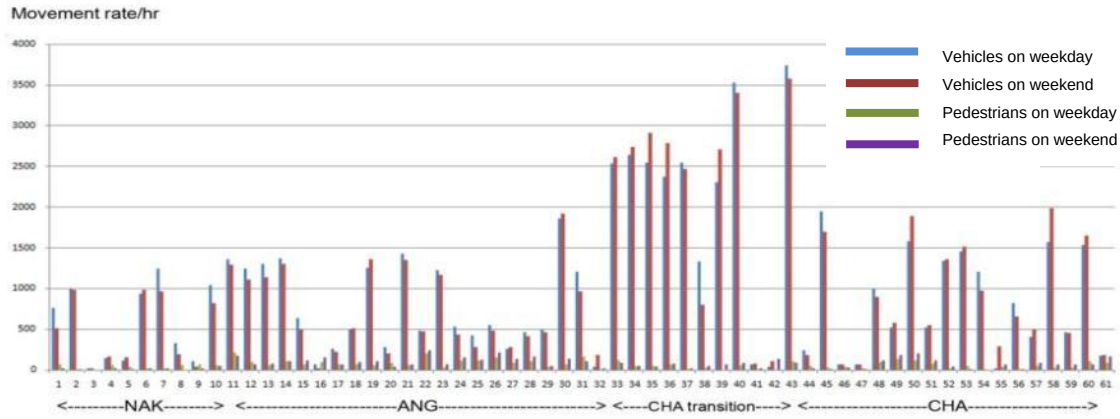


Figure 8.5 shows that there were significantly different movement patterns in the third-period retail areas. The movement patterns of the transition area of Nakhon Nayok had very different rates of pedestrian and vehicle movements, as well as vehicle movements between main roads and public places, which were the shopping centre or central bus station. The three spots with the highest vehicle movement rates were Gates 51 (1,104 unit/hour), 42 (987 unit/hour) and 46 (960 unit/hour), whereas the three spots with the highest pedestrian movement rates were Gates 58 (only 51 unit/hour), 57 (42 unit/hour), and 35 (40.5 unit/hour). Both vehicle and pedestrian rates were higher on weekdays than weekends. The main entrance to the Big One Centre in Nakhon Nayok was the only gate that had higher vehicle rates on weekends than weekdays, which suggested that weekend shopping at Big One was mostly done by using cars.

The movement patterns in the expansion area of Ang Thong had a distinctive feature; there were high pedestrian movement rates on all the surveyed routes. The areas with similarly high pedestrian and vehicle rates were at the main municipality's junction, and the roads inside Suwaphan agricultural market block. The three spots with the highest vehicle movement rates were Gates 49 (1,893 unit/hour), 40 (1,389 unit/hour) and 31 (1,337 unit/hour). The spots with the highest pedestrian movement rates were Gates 41 (225 unit/hour), 22 (195 unit/hour) and 45 (183 unit/hour). The vehicle movement rates on weekdays were higher than at the weekends, but pedestrian movement rates on weekends were higher than weekdays. This could mean that people normally walked and shopped in the market on weekends more than on weekdays, but also suggests the possibility of using public transport (as shown in the questionnaire surveys of modes of transport), which made vehicle movement lessen during the weekends.

There was a similarity in movement patterns among the new development areas, which were the transition and modern shopping retail areas in Nakhon Nayok and Chachoengsao. The vehicle movement rates were extremely high compared to the very low pedestrian movement rates of the same area, except for the entrance to the main features of the area such as rail station and shopping centres that had similar rates of vehicle and pedestrian movements. Both vehicle and pedestrian movement rates on weekends were higher than weekdays, particularly at the entrance to the railway station in Chachoengsao. Only in front of the school were pedestrian movement rates higher on weekdays than weekends, even though the survey was taken during a semester break. The three spots with the highest vehicle movement rates were Gate 70, which was the highway in front of the out-of-town central bus station and modern shopping centres (1,821 unit/hour), Gate 84, which was the main road in front of Carrefour Centre (1,782

unit/hour) and Gate 76, which was the road in front of Big C Super Centre and Major Cineplex (1,593 unit/hour). The three spots with the highest pedestrian movement rates were Gate 76 on the highway in front of Big C (159 unit/hour), Gate 74, which was the main entrance to Big C (156 unit/hour) and Gate 87, which was the location of a famous bakery shop (128 unit/hour). These spots apparently had very low rates of pedestrian movements, compared with cars and motorcycles and the average movement rates on weekends were higher than weekdays, especially at the modern shopping centres. Only at the junction to the local government office cluster were movement rates higher on weekdays than weekends.

According to the result of vehicular movements, the observation found the higher percentage of motorcycle compared to personal car usage in Nakhon Nayok (58:42) and Ang Thong (61:39), and the higher rate of personal car usage (54%) in Chachoengsao. For traffic movement by period retail areas, the highest rates of motorcycles were found in the first- and second-period retail areas of the three case study towns, including the expansion retail area of Ang Thong. Whereas the modern retail area of Chachoendsao and the transition retail area of Nakhon Nayok were found lower than the movement rates of personal car. It thus revealed that motorcycle is an important mode of transport in the provincial case study town context, particular in the older period retail areas.

Interactions in the Main Public Spaces of Retail Area

The fieldwork observations also captured activities in the main public spaces of the case study towns (further details in Appendix G), on weekdays and weekends and were recorded five times a day (Chapter 3).

Table 8.8 Density of socio-economic interactions in main public space

	Area	7.30-8.30		9.30-10.30		12.00-13.00		14.00-15.00		16.00-17.00		Average		
	Sq^2	WD	WE	WD	WE	WD	WE	WD	WE	WD	WE	WD	WE	AV.
NAK_1st	0.05	180	80	240	240	240	180	280	240	240	320	236	212	224
NAK_2nd WM	0.08	400	388	475	225	350	313	225	213	238	238	338	275	306
NAK_2nd	0.31	39	16	139	58	55	26	132	42	42	103	81	49	65
NAK_T	0.17	124	59	82	106	153	88	41	100	82	188	96	108	102
ANG_1st	0.03	167	0	100	267	133	333	333	200	367	300	220	220	220
ANG_2nd WM	0.1	940	1160	780	770	880	830	780	690	1260	760	928	842	885
ANG_2nd	0.03	300	167	267	133	0	67	0	0	400	500	193	173	183
ANG_E	0.1	760	900	580	740	580	520	860	1060	930	1240	742	892	817
ANG_node	0.03	467	833	1200	933	967	333	967	467	933	967	907	707	807
CHA_1st	0.07	229	271	243	257	214	0	100	200	243	257	206	197	201
CHA_2nd WM	0.09	711	956	644	822	722	500	444	200	478	311	600	558	579
CHA_ prom	0.04	225	150	200	325	250	100	150	225	300	300	225	220	223
CHA_T	0.25	12	24	60	56	16	32	48	16	36	28	34	31	33
CHA_M1	0.17	47	65	76	82	94	88	41	112	65	106	65	91	78
CHA_M2	0.19	0	68	37	42	32	53	42	63	21	37	26	53	39

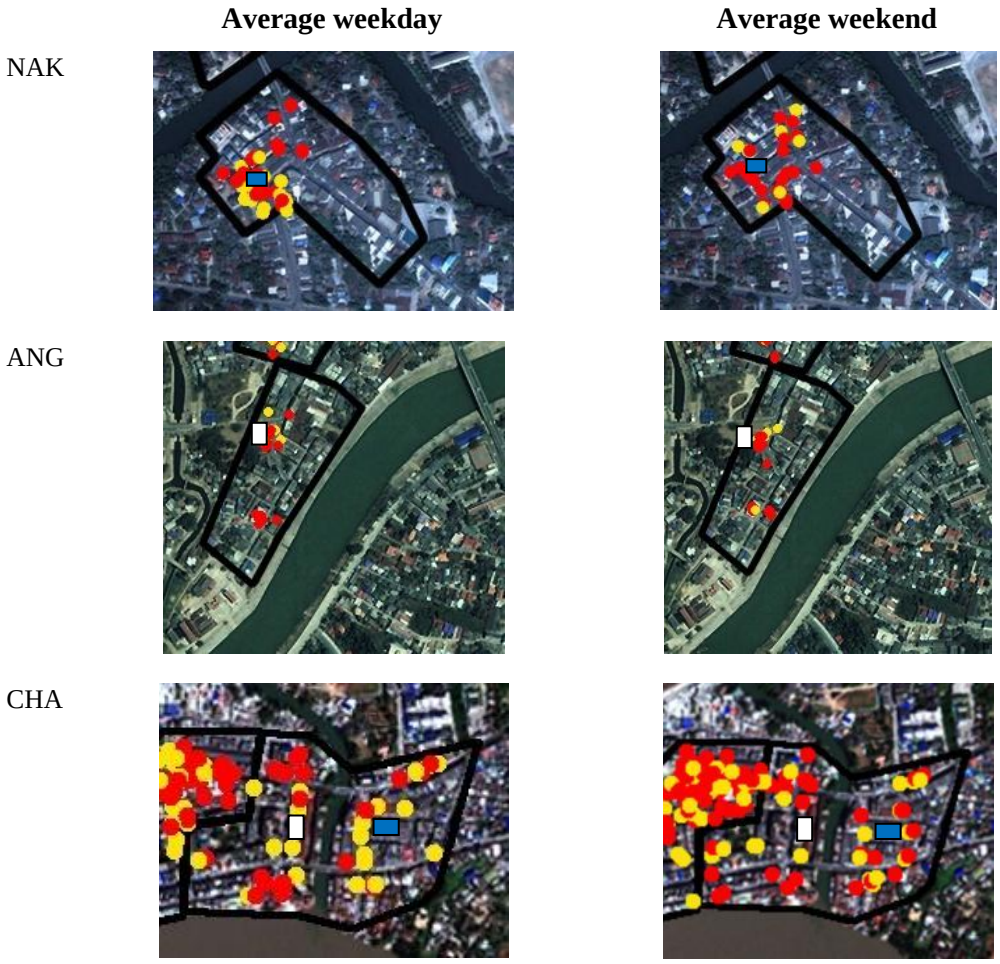
This data set was coded on the map in two different types and scores following the degrees of interaction which were normal or low interactions (as represented by yellow dots on) and mixed-various or high interactions (red dots). The studied public spaces were divided by the retail area development periods. Due to the differences of interaction patterns, some complex public spaces were further grouped into three subcategories: the second-period retail areas consisted of the wet market block (as represented by NAK, ANG, and CHA_2nd WM in Table 8.8) including its surrounding shophouses and the expanded blocks adjacent to the main wet market such as promenade and entrance blocks (NAK, ANG, and CHA_2nd); the expansion area of Ang Thong were divided into two areas, which were the main wet market area (ANG_2nd WM) and the transport node (ANG_node) situated in between the second-period and expansion area; and the third-period retail area of the most complex case, Chachoengsao, were grouped into three areas, which were the transition area of the Mahajakkapat Road (CHA_T), the main modern development area of multinational shopping centre and discount store including out-of-town central bus station (CHA_M1)

and the second-modern development retail area with night club and entertainment (CHA_M2).

First-period Retail Areas

There were several shared characteristics among the first-period retail areas of the three towns. Firstly, even though there were less frequent activities, a high density of public interactions was found in Nakhon Nayok and Chachoengsao's old retail areas by considering the ratio of socio-economic interactions and the size of the areas. Nakhon Nayok's average interaction density was the second highest at 224, whereas Chachoengsao was lower at 201 which was slightly lower than the promenade area. Secondly, both towns also had higher weekday (WD) interaction density ratios than weekends (WE), in which Nakhon Nayok was 236 (WD) and 212 (WE); Chachoengsao was 206 (WD) and 197 (WE). However, there were different patterns in Ang Thong, which had the same ratio of interaction density on weekdays and weekends and the old retail area also had a low average ratio compared to other public spaces in the same town at 220.

Figure 8.6 Mapping socio-economic interactions in the first-period retail areas



Thirdly, the composition of socio-economic interactions (see Figure 8.6) clustered in several public spaces, was predominantly in the surrounding alleys and small spaces in between the wet markets, of both active (blue square in Figure 8.6) and closed (white square) buildings and at the corner of local roads. In both Nakhon Nayok and Chachoengsao, the most interactive public spaces were around the wet market buildings, particularly the active or partly active wet market which was Wang Sakrajaom Market in Nakhon Nayok. In Ang Thong there were very low levels of public interactions, and the reason could be that there was no active wet market building in the area, which made the settlement of the main public spaces linear, differing from

the other towns. Chachoengsao had two old wet market buildings – one was partly active and another one was derelict and completely closed down. The partly active Kuakoon Market had more public interactions around the wet market, whilst there was no interaction in the area of the closed down CPB Market.

Finally, the types and characteristics of activities found in the old retail areas usually related to social and cultural activities more than economic, such as chatting with neighbours and children playing. The reasons behind this could be linked to the building use survey (Chapter 7), where there were high proportions of residential units in the old areas, particularly in Ang Thong. In Nakhon Nayok, there was the highest ratio of active shops and buildings, which produced a greater density in socio-economic interactions. Additionally there were old temples and social associations located in the old retail areas of these case study towns, for example, Chinese Associations and community job training centres.

Second-period Retail Areas

The socio-economic interactions in the main public spaces of the second-period retail areas had the highest density particularly in the wet market areas, compared to other periods (Nakhon Nayok at 306, Ang Thong at 885, Chachoengsao at 579). The other public spaces of the second-period retail areas (NAK_2nd and ANG_2nd) had the lowest levels of interactions and these were the promenade and nodal areas from the highway access to the wet market area of Nakhon Nayok and public spaces alongside the highway in front of the wet markets of Ang Thong. The promenade area of Chachoengsao had a high density of public interaction at 223, which was the highest rate compared to the usage of riverside space in the other towns. Moreover, the density of weekday interaction was generally higher than at the weekend in all the three towns.

Figure 8.7 Mapping socio-economic interactions in the second-period retail areas

Considering the location of socio-economic interactions (Figure 8.7), most of the interactions clustered around the wet markets. It was noticeable that the expanded public spaces connecting to the highways (outside wet market block) had very low interactions with low pedestrian movement. Near Nakhon Nayok's main municipal junction, opposite the hospital, there were repetitive interactions all day among people who were waiting at the informal van service stop; whereas the central bus station that had moved out-of-town had low levels of activities.

Figure 8.8 Types of riverfront area management in the case study towns

Nakhon Nayok

Ang Thong

Chachoengsao: normal day (left) and Chinese New Year festival 2013 (right)

Despite the low interaction density detected in Nakhon Nayok's expanded public spaces, the interaction record map showed that there were some interactions along the roadside – outside the gated promenade with a surrounding fence (Figure 8.8). On weekdays, this road was used by students who walked from the main town centre to schools which were situated in the area. On the weekends, this area was regularly used as the temporary street-food market every weekend night between 5 pm to after midnight. The public interactions that took place at the Chachoengsao's promenade were leisure activities such as fishing, sightseeing, as well as a meeting point, even though the area was normally very hot during the day (Figure 8.9).

Figure 8.9 Mixed-various interactions in the second-period retail areas

Social interaction between shophouses surrounding wet market block, NAK

Chest playing group in the New CPB Wet Market, CHA

Small services in front of shophouses around the first central-bus-station Market, CHA

Motorcycle services-interaction meeting point (morning rush hour)

Activities at the open space by riverbank, CHA

Social interactions among mini bus drivers

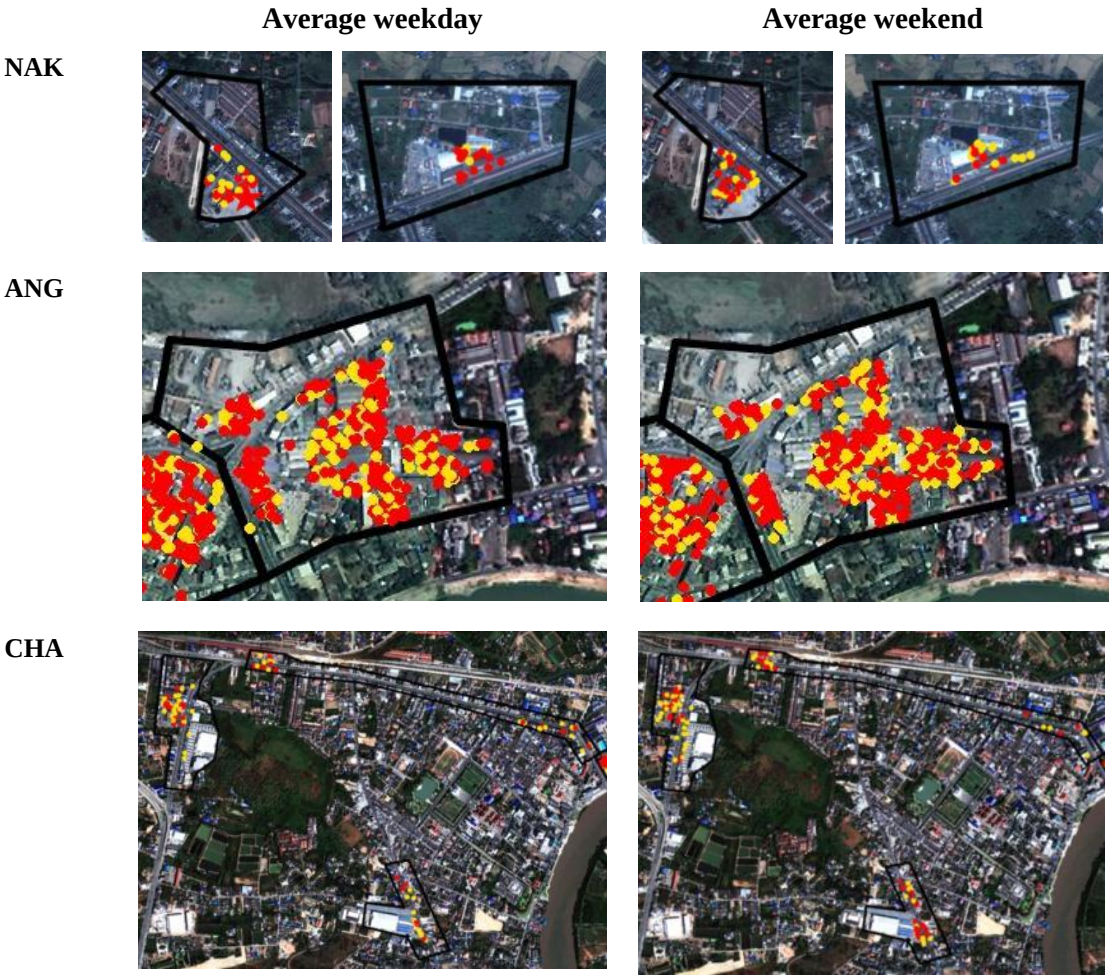
The major types of activities found in the second-period public areas related to the complex simultaneous economic and social interactions occurring during local trading. Customers normally needed to ask for the price and availability of the products, which were often placed out of hand-reach distance, amongst piles of mixed items. Prices were

often bargained down, depending on the customers' brief judgement of the items that were handed to them one after another for consideration. Throughout the process, shopkeepers and customers exchanged words and gestures, and their conversation might end up without trading activities but other kinds of informal social interaction. Within the community scale of the Thai context, apart from bargaining and returning/ exchanging goods, a customer might jokingly ask for, and unexpectedly receive, an extra item for free. Personal elaborate social interaction was a feature of retail encounters in the first and second period retail areas.

Third-period Retail Areas

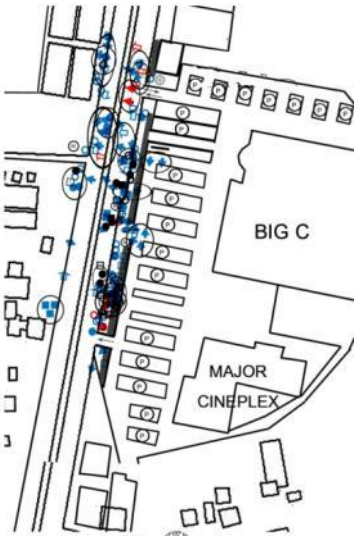
The density of socio-economic interaction in the new development areas was found to be very low in Nakhon Nayok and particularly in Chachoengsao, which was eight times lower than the average density found in the second-period area (50:400). Exceptionally, the expansion area of Ang Thong had a high interaction density (817) similar to the highest rate of the main wet market block (885). A similarity of interaction patterns between weekdays and weekends was found in new development areas. The transition area of Nakhon Nayok, expansion area of Ang Thong and modern shopping areas (M1 and M2 in Table 8.7) had higher densities of interaction on weekends than weekdays. However, the transition area of Chachoengsao had similar rates between weekdays and weekends, while the transport node of Ang Thong clearly showed higher interactions on weekdays (907) than weekends (707).

Figure 8.10 Mapping socio-economic interactions in the third-period retail areas

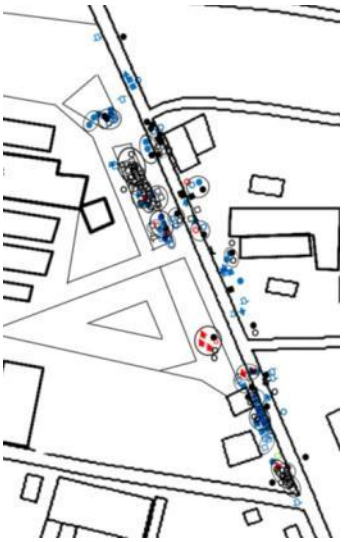


There was the same pattern of interactive locations in the new development areas (Figure 8.10). At the main entrances (on public roadside) of the modern shopping areas, which were Big C and Carrefour in Chachoengsao, the interactions normally happened in a linear form, spreading along the highways and main road, while in front of the modern shopping buildings themselves, there were no interactions. This pattern was also found in front of multinational modern supermarkets and convenient stores, such as the 7-Eleven and Tesco Lotus Express in Chachoengsao, located in the older retail areas.

Figure 8.11 Linear pattern of interactions in front of modern shopping areas in Chachoengsao



Big C and Major Cineplex



Carrefour Super Centre

Tesco-Express in CHA

7-Eleven in ANG

7-Eleven convenient store, CHA, in the morning (left) and evening (right)

Even in the prime locations, the interactions took place in public spaces derived from the process of loosely controlled local trade such as vendors and kiosks – not from modern trade (Figure 8.11). Another pattern was often found at transport nodes – central bus stations and train stations – in which some interactions were repeated at the main entrances approaching from the highways, and some were clustered inside the station. The public interactions detected in the new development areas were at normal or low degrees and were more related to economic activities than social interaction.

SPATIAL BEHAVIOURAL PATTERNS IN RETAIL AREAS

Considering these complex relationships between the spatial and physical characteristics of retail areas and retail patterns, there were several key findings.

The Importance of Movement Patterns and Socio-Economic Interactions in Retail Public Spaces

This research not only found that pedestrian movements were significantly connected to the prosperity of a town, but also showed the spatial/geographical findings of the socio-economic dimensions of different periods of retail area development.

Figure 8.12 shows two relationship patterns that were found in different period retail areas. In older period areas, pedestrian movement remained as an important indicator, which was directly related to the levels of accessibility (Integrations in the spatial analysis).

Figure 8.12 Relationship among location, levels of accessibility, and socio-economic interactions

NAK: accessibility at local level (R-local)

NAK: accessibility at global level (Rn)

ANG: accessibility at local level (R-local)

ANG: accessibility at global level (Rn)

CHA: accessibility at local level (R-local)

CHA: accessibility at global level (Rn)

A higher number of pedestrians could suggest the strength of retail areas, which generates further possibilities for social and economic interactions in the area. The

second pattern, of very high vehicular movement as opposed to pedestrian movement related to low interaction density and this was typical of the new development areas particularly on modern trade sites. Obviously seen from the maps in Figure 8.11, the pattern of public interactions of the old retail areas was not related to the most accessible areas (the highest Integration shown as red tone colours), but to the medium levels of accessibility (yellow to green colours). Conversely, the public interaction patterns in new development areas, clearly seen from the third-period retail areas of Nakhon Nayok and Chachoengsao, related to the top-three most accessible locations with very high vehicular movement.

Specific Characteristics of Travelling and Transport in Provincial Town Centres

It would be seen that the main mode of transport of the studied provincial town centres was based on motor-vehicles, particularly private cars and motorcycles. However, there were different characteristics of movement found between the older and modern development areas. The large number of private cars can be linked to the modern shopping areas while there were various modes of transport such as walking and public transport in old retail areas. For example, the new development areas of Chachoengsao and Nakhon Nayok found the highest rates of private cars usage, followed by that of motorcycles. This pattern was also found in the transition retail area of Nakhon Nayok. Only in the second-period retail area of Ang Thong and some parts of the same period of Chachoengsao were pedestrian rates similar to vehicle use.

Table 8.9 Statistical correlation between levels of accessibility and movement rate

NAK		Ped_sum	Ped_adj	Veh_sum	Veh_adj
Conn	Pearson Correlation	-0.009	.532(**)	.831(**)	.855(**)
	Sig. (2-tailed)	0.483	0.003	0	0
	N	25	25	25	25
R-local	Pearson Correlation	0.088	.520(**)	.782(**)	.822(**)
	Sig. (2-tailed)	0.337	0.004	0	0
	N	25	25	25	25
Rn	Pearson Correlation	0.104	.348(*)	.570(**)	.668(**)
	Sig. (2-tailed)	0.31	0.044	0.001	0
	N	25	25	25	25
ANG					
Conn	Pearson Correlation	-0.01	0.338	.593(**)	.527(**)
	Sig. (2-tailed)	0.96	0.068	0.001	0.003
	N	30	30	30	30
R-local	Pearson Correlation	-0.002	.384(*)	.755(**)	.743(**)
	Sig. (2-tailed)	0.994	0.036	0	0
	N	30	30	30	30
Rn	Pearson Correlation	-0.029	0.324	.766(**)	.774(**)
	Sig. (2-tailed)	0.879	0.08	0	0
	N	30	30	30	30
CHA_1st					
Conn	Pearson Correlation	0.36	0.61	0.639	0.623
	Sig. (2-tailed)	0.38	0.108	0.088	0.099
	N	8	8	8	8
R-local	Pearson Correlation	0.588	.787(*)	.750(*)	.765(*)
	Sig. (2-tailed)	0.125	0.021	0.032	0.027
	N	8	8	8	8
Rn	Pearson Correlation	0.699	.907(**)	.864(**)	.898(**)
	Sig. (2-tailed)	0.054	0.002	0.006	0.002
	N	8	8	8	8
CHA_2nd					
Conn	Pearson Correlation	0.076	0.27	.591(**)	.594(**)
	Sig. (2-tailed)	0.749	0.249	0.006	0.006
	N	20	20	20	20
R-local	Pearson Correlation	0.026	0.238	.584(**)	.574(**)
	Sig. (2-tailed)	0.913	0.312	0.007	0.008
	N	20	20	20	20
Rn	Pearson Correlation	0.073	0.257	.527(*)	.516(*)
	Sig. (2-tailed)	0.761	0.274	0.017	0.02
	N	20	20	20	20
CHA_3rd					
Conn	Pearson Correlation	.629(**)	0.424	.914(**)	.635(**)
	Sig. (2-tailed)	0.004	0.071	0	0.004
	N	19	19	19	19
R-local	Pearson Correlation	.531(*)	.492(*)	.713(**)	.630(**)
	Sig. (2-tailed)	0.019	0.033	0.001	0.004
	N	19	19	19	19
Rn	Pearson Correlation	.566(*)	0.282	.537(*)	.607(**)
	Sig. (2-tailed)	0.012	0.243	0.018	0.006
	N	19	19	19	19

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

An important aspect of the way movement behaviour links to the local context of provincial towns was the amount of movement using motorcycles. By grouping motorcycle users into the same category as pedestrians and then using this mixed movement category to find statistical correlations with the levels of accessibility (or Integration from spatial analysis), as represented by the average traffic counts, the relationships between the two variables were significantly increased. This reflects the retail behaviour and use of space through ‘trading on wheels’ or ‘drive-through’ behaviour of local shoppers, as was clearly seen (see Table 8.9) especially in Nakhon Nayok, in which the correlations between movement rates (both pedestrian and vehicle) and levels of accessibility (both local and global levels) became stronger. However, it should be noted that this regrouping scheme did not work in Chachoengsao’s second-period market due to the (regrouped) correlations having slightly lower level of significance than the original correlations – 0.574 (**) and 0.584 (**) at local level, and 0.516 (*) and 0.527 (*) at global level.

Figure 8.13 General motorcycles usage in the case study site (above) and similar transport characteristics in Southeast Asia (below)

Tetsaban wet market, NAK

Suwaphan wet market, ANG

Motorcycle-use behaviour in provincial retail areas, Dong Xoai, Vietnam

Para-transits in provincial town of Philippines

Source: http://www.gt-rider.com/ and http://linmarrtowers.com/

The main reason behind the regrouping was the strong evidence during fieldwork that there were motorcycles in use everywhere in the town centres, including in the small alleys in which many customers habitually shopped while still sitting or riding on the back of their vehicles (Figure 8.13 - above). In the provincial town context, motorcycles were particularly well adapted and used in all areas, being able to navigate through narrow alleyways in wet markets as well as highways. Some motorcycles were also transformed into multipurpose vehicles such as mobile vending stalls and carriages, as well as motorcycle-taxis.

The informality such as motorcycles, para-transits and rickshaws could be implied as the characteristics of regional transport across Southeast Asia (Figure 8.13 - below). This is generalizable but has not been considered in other researches of retail urban development in the global South.

Table 8.10 Trends of movement patterns and interaction density

Retail area	Vehicular movement	Pedestrian movement	Average movement	Interaction density
First-period	NAK>CHA>ANG	CHA>ANG>NAK	WD>WE [20]	WD>WE[21]
Second-period	CHA>NAK>ANG	CHA>ANG>NAK	WD>WE [22]	WD>WE
Third-period	ANG>CHA>NAK	ANG>CHA>NAK	WE>WD [23]	WE>WD[24]

Table 8.10 summarises the movement and public interaction patterns. Firstly, the older period retail areas were used more in terms of travelling movement, especially by pedestrians with more interaction on weekdays than weekends. In contrast, the third-period retail areas, particularly in modern shopping centres, were popular on weekends. Secondly, the different behavioural patterns between weekdays and weekends would link to the area's main function as well. The areas used more on weekdays suggested there were offices in the area; on the other hand, more usage on the weekends might imply the recreational and/or residential functions in these areas.

Finally, the analysis also found significant movement characteristics of the transition and the modern shopping areas, which was the extremely different ratio between

[20] Except for pedestrian movement rate in ANG
[21] The same rate between weekday and weekend in ANG
[22] Except for Borbua and CPB Wet Markets, not much different between vehicular and pedestrian rate in ANG
[23] Except vehicular movement rate of ANG
[24] Except for ANG, and not much different between weekday and weekend in the transition area of CHA

amounts of traffic and pedestrian movement on the major roads and the car movements on adjacent minor roads. The reasons might be that these new development areas were often situated on highways, which had high levels of accessibility, and that the dense clusters of shops attached to and alongside the main roads in a linear pattern often caused traffic congestion.

SPAIAL SEGREGATION IN RELATION TO THE POLITICAL ECONOMY IN THE CONTEXT OF PROVINCIAL THAI TOWNS

Differences in Socio-Economic Status of Retail Area Users

Theoretically, there is a strong relationship between physical and social segregation in urban studies. The analysis in Chapter 6 found some development areas of the studied provincial towns with characteristics of spatial segregation to some degree, for example the emergence of various forms of gated communities and large-scale urban projects with low levels of accessibility. To prove that the characteristics and degrees of spatial segregation in the case study towns relate to social segregation, the analysis explored the social differences or gaps among the different statuses/classes of people. Therefore, the socio-economic status of retail area users was estimated and represented in this section by using demographical indices from the questionnaire surveyed data which were: 1) education, 2) occupation, 3) disposable income and 4) residential type.

Table 8.11 Demographic data which relates to socio-economic status

	1st %	2nd %	T %	E %	3rd %
Occupation					
Lower socio-economic status	53	38	44	44	28
Higher socio-economic status	47	62	56	56	72
Education					
Lower socio-economic status	51	53	56	34	22
Higher socio-economic status	49	47	44	66	78
Income[25] (per month)					
Lower socio-economic status (lower than 150 GBP)	11	25	10	16	8
Higher socio-economic status (more than 200 GBP)	82	59	90	68	86

Table 8.11 shows the diversity of socio-economic and demographic data drawn from the responses to the questionnaire survey. The 'difference of percentages' was used to differentiate between the lower and higher socio-economic status of customers in particular retail areas. Overall, the modern shopping areas of Chachoengsao had the widest socio-economic gap amongst the lower and higher socio-economic status consumers according to occupation, education, and income. When considering occupation and type of employment, the lower class (i.e. part-time employees, unemployed/seeking jobs, retired, looking after family/home, full-time student and others) and upper class (i.e. office workers/full-time employees and self-employed/business owners) in Chachoengsao's modern shopping areas had differences of 44% (28%:72% respectively), while the second-period retail areas had a smaller difference of 24% (38%:62% respectively).

[25] With reference to standardized/average wages of diploma graduated workers at 8,000-8,500Baht per month (160-170 GBP/month) in 2011

The respondents' education was classified into lower education (i.e. lower primary school, primary school, secondary school) and higher education (i.e. diploma/certificate, bachelor degree, higher education). This showed the highest difference at 56% (22%:78%) from the customers of modern retail area of Chachoengsao, followed by the expansion area of Ang Thong which was 32% (34%:66% respectively). The income factor was classified into lower income (i.e. lower than 8,000 Baht or 160GBP per month) and higher income (i.e. higher than 8,000 Baht or 160 GBP per month) by referring to the average monthly income of a Thai citizen with a diploma at 8,000 Baht per month. The transition area of Nakhon Nayok had the highest difference at 80% (10%:90% respectively), followed by the modern shopping areas of Chachoengsao at 78% (8%:86% respectively).

Table 8.12 Type of residence

	1st		2nd		T		E		3rd	
	N	%	N	%	N	%	N	%	N	%
Type of residential										
House in gated community/ housing estate (own)	1	1.19	11	5.82	0	0	8	9.64	1	1.96
Stand-alone house or shophouse (own)	73	81.90	143	75.66	33	84.62	64	77.11	45	90.24
Rental house/apartment	9	15.71	31	16.40	4	10.26	9	10.84	5	7.80
Rental unit in governmental housing	1	1.19	4	2.12	2	5.13	2	2.41	0	0

The majority of respondents (over 75%) in all retail areas lived in stand-alone houses or shophouses and the respondents in the modern shopping areas of Chachoengsao had the highest proportion at 90.24% (Table 8.12). As for housing estates and gated communities, the highest proportions were found from the respondents in the expansion area of Ang Thong (9.64%), the second-period (5.82%), the modern shopping areas of Chachoengsao (1.96%) and the first-period (1.19%), but none were found in the

transition area of Nakhon Nayok. For rented housing, the first (15.71%) and second-period (16.40%) retail areas were higher than other groups; whereas the modern shopping areas of Chachoengsao had the lowest proportion of respondents who lived in rented properties (7.80%).

Considering the differences of the demographic indices (i.e. education, occupation, and disposable income) between lower and higher socio-economic status, the analysis found a higher proportion of high socio-economic status customers who shopped in the new retail areas. There was also a considerable difference in proportion between higher and lower economic status groups of customer, in which most customers of the third-period retail areas were of the higher socio-economic status group. On the other hand, there was a more balanced proportion between lower and higher status groups in the older retail areas. This could initially suggest that the new development areas attracted the higher status customers when compared to other retail areas. In contrast to the results of other demographical indices, the people living in gated communities, which normally suggested higher status, did not link to any socio-economic differences of users in any particular areas.

It is possible that in the economic context of provincial Thai towns housing estates in small-to-medium sized towns had been developed with less diversity in terms of range of socio-economic status, compared to luxurious estates available in the large cities or towns with specialties such as tourism. This might have caused the unclear effects/results in terms of socio-economic differences in the category of housing, as reviewed from urban studies literature. A further consideration was that more differentiation in retail behaviour was linked to different socio-economic statuses

between residents in (owned) stand-alone houses with higher incomes, instead of gated communities, and those in rental houses/apartments with lower incomes.

Spatial Segregation and Conflicts in Society

According to the literature on urban segregation, two aspects are analysed together – spatially/physically and socially (Hillier, 1996a; Vaughan, 2005). In Chapter 6, the features of spatial segregation had been detected in the case study sites to some degree. The analysis of this chapter supported this assumption by finding the differences in socio-economic status among the customers in different period retail areas. Furthermore, the effects of spatial segregation in relation to human retail behaviour could be illustrated and also pertained to conflicts concerning the use of public space.

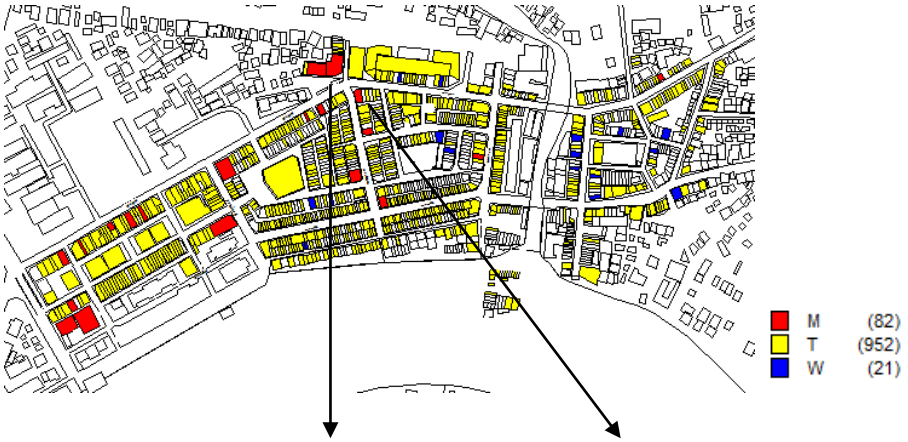
Modern trade replacements; conflicts in urban land usage

It has been found that modern and multinational retailers can often generate social conflict at the local community level, being viewed as a threat to the survival of existing town centres (Suebsukcharoen, 2002). From the behavioural data analysis, there seemed to be indications that there was a greater use of modern shopping areas in terms of time money spent, and commuting distances, compared to the older retail areas. The general reasons are often that modern businesses have strategies to design an attractive environment in order to persuade people to spend more of their time and money at the site, including multinational modern retailers, which have an influence in drawing people from further away who use cars.

Figure 8.14 Modern trade replacements in town centres

Replacement of local convenient store by multinational brand, ANG

Protest banners against Tesco-Lotus supermarkets by local retailers in 2010, NAK



New form of modern chain and retail-convenience stores and supermarkets surrounding wet market in CHA

The previous chapter (7) revealed the life cycle of provincial town development, in which modern trade was one of the strongest driving forces generating the cycle. On one hand, modern development areas were built and formed the new shopping areas at the fringe of the town. From the viewpoint of spatial analysis, these large-scale modern businesses were normally located on the most accessible roads, which results in the new development areas being generally separated from others in linear or sprawl patterns. Modern businesses in the context of developing countries are normally gated communities, to some degree, which creates a discontinuity within the spatial network of the town. On the other hand, at the existing town centres, some shophouses were taken over and/or replaced by modern-trade brand retails (Figure 8.14-left). In the case of Nakhon Nayok local retailers protested the establishment of Tesco-Lotus Express supermarket in the town centre (Figure 8.14-right); the property developer was the property owner that wanted to replace the traditional vendors and stalls with a new global brand discount store (Tesco-Lotus Express). The retailers and community members filed a petition to the municipality office and threatened to cut off the water supply and electricity to the commercial block if the project continued. The conflict ended with the establishment of the property owner's new small shopping centre that was protected from its surroundings (i.e. with 24-hour guards) that strictly prohibited trespassing.

From political economic aspect, the replacement and penetration of modern retailers is an aspect of the influence of global trade. These new forms of retail development were identified as relating to urban segregation and led to social conflicts in the case study sites. These were local and small in size and not part of a generalized movement of social dissent on this issue since in Thai society at this time, widespread social protest

was considered to be unwelcome and was generally suppressed. Focusing on urban development policies and practices of these provincial towns, road-orientated policy with general and loose regulation brought about urban dispersal. Market-oriented policy under capitalism had caused the decline of older retail areas. Increasing of conflicts in urban land use could result in the corrosion of both social and economic strengths of community. Similar cases of urban conflict have happened in many provinces of Thailand, and local authorities resolved the problems case by case using an ad-hoc approach. On the other hand, a Retailing Act has been proposed to government since 2000 by the Thai Retailers Association. However, it has been restrained by free trade agreement devised on multinational retail investors (Economic Reporter Thairath, 2012). This remains a contentious unresolved issue for local traders and retailers in Thailand.

Transformation of provincial town's retail areas; disappearance of some social interactions

It was clearly shown that small-scale retailing including the informal economic sector in the form of shophouses and vendors has been a long term socio-economic driving force of urban neighbourhoods and is important to the economic structure of provincial towns. According to the research undertaken here, it was observed how the cluster of the main retail areas has become the heart of the town centres, spontaneously mixed with various socio-economic interactions and public facilities for almost 24 hours of every day. In contrast, the new shopping areas had food products only available in food sections within the department stores. The absence of a wet market setting, whether in the new developments or as replacement businesses in older town centres, or in some case of urban regeneration, has significantly affected socio-economic interactions.

Table 8.13 Reasons for shopping in each period market areas

	1st		2nd		T		E		3rd	
	N	%	N	%	N	%	N	%	N	%
Product	19	19	42	30	2	9	19	37	18	21
Management	21	22	23	16	4	19	9	17	43	51
Relationship	34	35	43	30	8	28	9	17	6	7
Accessibility	23	24	34	24	10	44	15	29	18	21

To confirm the argument that there was very low social interaction in the modern retail development areas, the relationship aspect (see Table 8.13) revealed the lowest with only 7% responses in the third-period retail areas of Chachoengsao; whereas the highest was the first-period retail areas (35%) followed by the second-period retail areas (30%). The relationships between retailers and customers in modern centres were different, with less casual talk about daily life or mutual concerns and less bargaining.

In terms of spatial settlement patterns, the linear patterns of peripheral development do not normally create any enclosure. Conversely, the fine grid pattern road network can generate and promote various activities and interactions, which in the case study sites was evident at the locations of wet market areas. Therefore some conclusions regarding socio-economic interactions can be drawn here. There were high levels of social and economic interaction among retailers and between retailers and customers in the older retail areas. The social interactions in the old market areas were those of bargaining activities and daily conversations of small retailers including other informal economic activities and social interaction. On the other hand the modern development areas had very low levels of social interaction, particularly in outdoor spaces. In the modern trade areas, the relationships between retailers and customers were more formal with no

bargaining and less social interaction within comfortable enclosed spaces with the potential for social interaction, in contrast to the crowded older retail areas.

From the political economic aspect, traditionalism and informality are important in terms of urban development and planning in the context of global South (Roy, 2005; Ong, 2006). This research had revealed that local/traditional retail areas were the liveliest in both social and economic activities of the towns. However, the older retail areas in the provincial towns tended to decline because of global trade replacement as shown in the case study sites. Following the modern development policies without looking at the local context has brought about top-down and general framework of problem solving. Informality such as vendors and squatter settlements are not included in planning and viewed as unauthorised (Roy, 2005) even they has existed and played important roles in urbanisation. In the movement behavioural analysis, motorcycle usage was often included in motor vehicle mode, as similar to cars and other sorts of motor-vehicle, though in this context motorcycles were used differently. Riding motorcycles in Thai provincial towns was popular because it was an effective way to access both pedestrian and highway areas by navigating narrow alleyways in old town areas and also unrestricted highways of provincial towns. Shopping was possible without dismounting from the cycles and throughout all the retail areas, there were motorcycles as evidenced in the photographs in this chapter. This particular characteristic can be found across Southeast Asia.

Urban Development Policies in Relation to Spatial Segregation in Provincial Thai Towns

Different approaches and mechanisms of urban development can reflect the planning policies and provision of central government. Evidence from the case study sites, such

as slum clearance at the riverfront in Nakhon Nayok and Chachoengsao and the elevation of the road level with a high flood dyke along the riverside in Ang Thong, were clearly a result of top-down urban planning influenced by a market-oriented economy and policy using the process of 'destruction' and '(re)creation' (Brenner and Theodore, 2002). By prioritising urban order reorganisation and 'best use' policy as the main reasons, the provision disregarded people's needs or behaviour patterns and did not take into account the local context.

In Thailand, there were many examples of protest and pressure by local inhabitants in provincial towns against the arrival of multinational retailers (e.g. Economic Reporter Thairath, 2012; Meksangsouy, 2012). Their expansion into provincial towns was a reflection of the impact of modern trade and the lack of locally appropriated regulation by government to ensure economic controlled competition. The authorities might have been aware of the problems but had also been pressured by the multinational industrialists and retailers. These types of conflicts are common according to the political economy literature, in which modern urban development is a product of capitalism that can generate uneven urban development and also increase differences among different socio-economic groups (Smith, 2008, Harvey, 2006, Dennis, 2008) and there was clear evidence of this in the case study towns.

DISCUSSION

This chapter addressed the fourth research question of how differences in the spatial and physical characteristics of retail area developments have influenced the retail behaviour patterns of users. The analysis revealed the different retail behaviour patterns of users and the different, spatial configurations of the retail areas. Apart from the aspects of

location and built environment of each retail area, the analysis showed that there were also differences in terms of settlement patterns related to spatial behavioural patterns.

The transition and third-period retail areas exhibited linear or node settlement patterns. The locations of these modern shopping centres were found to be related to the most accessible roads such as highways and bypass roads out of town, which benefited the accessibility of motor vehicles, particularly private cars. On the contrary, the characteristics of older-period retail areas, which were developed in dense grid patterns, provided more benefit to pedestrian movement and activity.

The fieldwork observations found motorcycle usage in provincial towns to be an effective mode of transport, which was more similar in pattern to pedestrian activity than a car in its movement characteristics. Both pedestrian and motorcycle movement were the 'heartbeat' of the old town centres. For example, the liveliest areas or 'live centre', with mixed users and various socio-economic interactions, were the second-period wet market areas and the surrounding shophouses. By contrast, there was a considerably lower level of socio-economic interactions in the modern shopping areas.

Settlement patterns and the spatial configuration of each retail area have generated different behavioural patterns in several ways. An important issue discussed in this chapter was spatial segregation that led to conflicts in urban land usage segregation, which theoretically could be linked to the widening of the social (economic) gap (Vaughan, 2005, Kozak, 2008) in different period retail areas. The results from questionnaires revealed that there were socio-economic differences in the ways in which consumers of differing socio-economic status used the different retail areas. This research found customers of new retail areas as having considerably higher status, when compared to the first and second-period retail areas that contain more balanced groups

of customers. The evidence suggests that modern trade and business developments are more attractive to higher status customers. This could also imply that modern trade development tends to generate differences and possibly divide people into social status groups, such as elite and inferior (Brenner and Theodore, 2002, Davis and Henderson, 2003).

In fact shopping activity and shopping areas should always be considered as part of urban life with diverse activities available for everyone (Williams, 2003) to promote equal opportunity for the social interaction among all groups (Harvey, 2003). However, there was a lack of supporting evidence from the residential segregation viewpoint, which the literature review had suggested was an important issue in urban studies. Therefore instead of using gated community the indices that could be more related to different indicators of socio-economic status were stand alone or detached houses. For these reasons, the existence of spatial segregation in some out-of-town developments, as summarised in Chapter 6, was found at some degrees in the case study towns in association with the socio-economic segregation.

Using the context of global South, this research revealed that the different conditions in provincial case study towns had led to different urban development processes under globalisation which were dynamic and complex. Global trade has generated diversity in modern retail development. These market-oriented policies allowed modern retail traders to replace traditional/local businesses without appropriate regulation. The emergence of modern development was addressed as a generator both of spatial and social segregation and a more unequal society (Harvey, 2003, Vaughan, 2005, Kozak, 2008). In addition, modern top-down development policies had caused problems in transitional area development as shown in the case study sites. This chapter also pointed

out that some indicators generally used in urban segregation theory would not be appropriate in the context of small-to-medium-sized towns because of the differences in diversity of property market, such as residential types linked to the degree of urban segregation.

The analysis of this chapter also illuminated the importance of informality and traditionalism/localism in terms of creating the characteristics of provincial town centres where there is diversity in socio-economic activities and local retail social interactions. Analysis of the modes of transport in the provincial towns revealed the distinctive widespread use of motorcycles due to its effectiveness in accessing both pedestrian and highway areas and allowing for social interaction with retailers. Consequently in the analysis, motorcycles were categorised as part of pedestrian movement. The analysis of retail patterns in different periods of retail areas revealed that many of shophouses in the older period retail areas had declined in terms of their physical condition and economic usage. However, a number of these shophouses were still actively used, especially those providing special products and services, such as for religious and cultural purposes. The continuity of strong relationships between customers and business owners also played an important role in the survival of these old quarters. These evidences were exemplified and supported the different dimensions of urban development in the context of global South needed for consideration in planning.

The next chapter will discuss the original contribution to knowledge of this thesis empirically and conceptually.

CHAPTER 9

CONCLUSIONS

This research study is an analysis of the impact of globalisation on the socio-spatial dimensions of towns in the context of the global South, through a multiple sited case study of three provincial towns in Thailand. The conceptual framework was primarily based on the spatial configuration of the built environment and secondarily on the spatial political economy in relation to retailing. The four research questions were as follows: 1) How has the socio-spatial structure of retail area development in Thai provincial towns changed over the last 50 years?, 2) What are the characteristics of urban expansion in relation to retail area development in provincial towns, and does it show any features of spatial segregation in the different contexts?, 3) How have new retail developments affected the spatial properties of the main retail areas and led to the decline of older retail areas? and 4) How have differences in the spatial and physical characteristics of retail area developments influenced the retail behaviour patterns of users?

The socio-spatial processes of urban transformation as a result of globalisation were empirically observed in the field and analysed by applying space syntax methods and software in three representative medium-size provincial towns in Thailand, which shared common criteria as set out in Chapter 4. The specific research foci were the retail areas covering three time periods, in order to capture the effects of socio-spatial changes and to extend understandings of the complexities of the impact of globalisation at the local level in this setting. This research used mixed methods to deal with the dynamic

and complex urban transformation occurring in this part of the global South. The research design included triangulation through combining the analysis of spatial configuration, with information about the political economy, and structured field observations and a survey using a questionnaire. Thus there were four main types of data: 1) Secondary data and maps of urban development over periods of time in these towns; 2) Spatial configuration analysis using Depthmap software from space syntax; 3) Structured observations; and 4) A questionnaire survey of the retail behaviour of consumers.

How has the socio-spatial structure of retail area development in Thai provincial towns changed over the last 50 years?

This research question was addressed through an analysis of the process of urban change in the case study towns, focusing on retail developments over the last 50 years. In accordance with the conceptual framework, two datasets were analysed together namely data on the physical and spatial configuration, and aspects of the political economy. The collected measurements of physical urban development and spatial configuration focusing on retail areas revealed that the locations of the main retail areas or the 'live centres' were mostly the same as the centres of 'spatial centrality' in each retail development period. This meant that changes in physical urban development and the centres of activities related to spatial configuration changes. The spatial configuration analysis also suggested that the locations of the main retail areas were closely linked to the 'integration cores' or 'spatial centrality' as well as to the main transportation hubs. These findings concurred with other urban contemporary studies in terms of urban settlement and form (Bowden, 1982; Paksukcharern Thammaruangsri, 2003). Spatial centrality of the towns had shifted from the main roads linking both sides

of the rivers, where the original town centres were developed historically at the waterfronts, to the main retail areas gradually being located further away from the river, and most recently along the bypass roads or on the fringes of the towns. In principle, spatial configuration analysis looks at the complex network of public spaces, which means changes in some parts of these towns inevitably affected other areas (Hillier, 1993; Hillier and Iida, 2005).

Considering the spatial political economic aspect which is the secondary conceptual framework of the research, the process of spatial and physical urban changes was related to the political economy in many ways. The analysis of the urban development of the case study towns over time revealed the gradual expanding, intensifying and shifting of their centrality from the 1970s. The road networks of these towns had changed through the construction of bypass roads during the 1990s, which led urban growth to spread further outside the existing town centres without effective planning and control regulation. The changes in movement behaviours could be a result of modern development policy which focused only on the road-oriented approach and promotion of motor vehicle dependency. It thus encouraged sprawling, dispersed urban settlement and resulted in changes in land use transformation.

What are the characteristics of urban expansion in relation to retail area development in provincial towns, and does it show any features of spatial segregation in the different contexts?

The characteristics and socio-spatial processes that led to increasing urban segregation in the provincial Thai towns were identified by using three measurements of physical and spatial analysis, the imbalance between physical development and public space usage and the spatial political economy. The peripheral development commonly

emerged on bypasses or highways and often occurred in a linear settlement pattern. The spatial properties revealed that some areas tended to be segregated from the whole town when compared to other sub-centres. On the one hand, some of the new development areas gradually gained in importance in terms of the physical (land use) and spatial (accessibility) development, such as the modern shopping centre areas. On the other hand, some of them were developed for specific purposes and became spatially segregated from the whole town, such as the high-density low-income settlements behind the railroad and ring road (with flyover), and the factories and surrounding residences. It can be concluded that spatial segregation in the context of the provincial towns referred to areas that were difficult to access with limited connections to other parts of the towns and with an imbalance between the density of public space usage and physical development. The common characteristics of spatial segregation are: 1) lack of variety in public land use; 2) discontinuity of urban growth; 3) low levels of spatial accessibility and connectivity, which closely link to the subjects of spatial configuration studies (Azimzadeh, 2003; Hillier, 1996a); and 4) imbalance between physical development and public usage which is shown by 'big differences' between OSR (Open Space Ratio) and compactness.

From political economic point of view, spatial segregation was viewed as a shared physical feature of contemporary cities and modern cities (e.g. Lynch, 1981; Bruegmann, 2005; Jenks et al., 2008), influenced by the processes of globalisation (Potter and Lloyd-Evans, 1998; Bauman, 1998a; Marcuse and Kempen, 2000). The reasons were that global trade and modern markets were documented as bringing about large-scale and self-contained urban projects with high security/surveillance such as factories, gated communities and modern retail malls, which broke up and fragmented

the network of public spaces. The analysis of spatial configuration also established that the road network of the new development areas including land use transformation altered the centrality of the towns. Consequently, urban development policies supporting a road-oriented and market-oriented economy were highlighted here as the main generator of spatial segregation in the case study sites. It was established that there was an increasing degree of urban segregation in the case study Thai provincial towns although with some particular local and contextual characteristics pertinent to the global South.

How have new retail developments affected the spatial properties of the main retail areas and led to the decline of older retail areas?

The research findings addressed this question through the analysis of the processes and trends of socio-spatial development of the main retail areas in provincial Thai towns. The analysis found various phases of retail area development in the case study towns that could be conceptualised as the life cycles of retail areas. Some locations that had once been vital as main economic centres for a period then declined. New locations with higher degrees of accessibility replaced the older ones over time. The deterioration of retail areas was not only identified through the decline of the accessibility levels, noticeably inferior to other locations, but also by the low degrees of Intelligibility and Synergy and the eventual decline over time. This socio-spatial process of retail area development and redevelopment is closely linked to the emergence of modern trade developments. It could be implied that the emerging new retail developments had led to the decline of older retail areas and the spatial configuration analysis illustrated the dynamic process of retail development, i.e. transition and expansion in modern periods. Urban redevelopments were found increasingly in older retail areas of the case study

towns, such as the improvement of riverfront areas, the renovation of old shophouses and reconstruction of wet market buildings. These redevelopment areas were specifically improving the conditions of the spatial properties.

This study has revealed the diverse process of retail area development in the case study provincial towns including the complexity of economic markets being penetrated by global trade and changing customer behaviour. The life cycles of retail areas were also represented by the multiple layers of social relations in urban society, such as the strength of the local economy, localities and conflicts of interest between local and global retailers in relation to space usage. From the political economy standpoint, urban development often alters urban land use and can result in conflict (Smith, 2008; Harvey, 2006; Dennis, 2008). This was clearly seen in the development of retail areas, particularly with the presence of multinational branded retailers, which affected the survival of local traders (Thailand Development Research Institute, 2000; Economic Reporter Thairath, 2012). There were some social conflicts in the towns such as protest concerning the planned expansion of multinational brand retailers including relocations of some public buildings and low-income residential areas. These conflicts revealed the weak regulatory framework of planning policy in the provincial context in Thailand which has been noted in other studies (e.g. Pattana-Anek, 2000; Glassman and Sneddon, 2003; Usavagovitwong, 2012). Local government only dealt with the problems by correcting them case by case. On the other hand, the state has not yet issued legislation or policy for long term retail regulation and planning. The development of modern retail complexes in Thai provincial towns in this study was therefore related to increasing urban injustice and uneven development.

How have differences in the spatial and physical characteristics of retail area developments influenced the retail behaviour patterns of users?

The analysis revealed different types of retail behaviour in the different settlement patterns and spatial configurations of the retail areas. Apart from the aspects of location and physical condition of each retail area, the older areas were developed as intensive grid patterns while the newer developments were linear or nodal in type. The locations of new retail areas were associated with the most accessible roads for private motor vehicles whereas the old retail areas had higher degrees of public transport and pedestrian use.

The different retail patterns not only reflected the characteristics of each retail area but were also linked to different economic activities and retail structures according to the period of retail area development. The higher number of various pedestrians suggested that one of the strengths of these retail areas was in terms of economic support including social cohesion. This evidence was supported by other studies of town centres (van Leeuwena and Rietvelda, 2011; Azimzadeh, 2003; Jacobs, 1961), in which pedestrian activity generated further possibilities of socio-economic interactions in the area. It should be noted that spatial configuration analysis further revealed that the degrees of interactions did not relate to the highly accessible areas but to the areas with medium levels of accessibility. This could explain why socio-economic interactions were found to be lower in the public spaces of new retail area developments

The new development areas at the periphery of the towns had higher degrees of spatial segregation than the areas within or closer to the town centres (see conclusion of Chapter 6). Modern developments were documented as being associated with increased social divisions and bringing about conflicts in community (Brenner and Theodore,

2002, Davis and Henderson, 2003). The retail patterns analysis supported the existence of social segregation by illustrating socio-economic differences between lower-income and higher-income users, especially the customers who normally shopped in the modern retail areas. Other research has suggested that urban segregation can increase social inequalities such as manifested through the development of residential gated communities (Vaughan, 2005; Kozak, 2008). However, this research study extended understandings of this view in the way that different relationships could happen under different contexts. Living in gated communities such as subdivision housing might not be the only indicator for urban segregation due to the low diversity in property market of these provincial towns as compared to the big cities in other contexts. The study findings support the idea that urban development policy which has been primarily developed in the global North should be revised to include the diversity of processes and practice in the political economic context of global South (Robinson, 2013; Parnell and Robinson, 2012).

Another aspect of the retail behaviour related to socio-spatial processes and the political economy was the way in which informality, localism and traditionalism all played an important role in the process of urban development in the case study sites. The behaviour of local people in terms of their movements and social interactions were found to be influencing the survival of all of the retail areas. The widespread use of motorcycles for transport and shopping enhanced the informal social interactions between customers and retailers in the older-period retail areas.

THE SOCIO-SPATIAL FACTORS OF URBAN CHANGES

Table 9.1 summarises the effects of both the socio-spatial network and socio-spatial political economy, in accordance with theoretical framework of the research, on urban retail development in the case study.

Table 9.1 Socio-spatial network effect and spatial political economic effect on urban changes

Impacts of globalisation	Socio-spatial Network Effect	Socio-spatial Political Economic Effect
The process of retail area development change over the last 50 years (Chapter 5) Characteristics of urban expansion in relation to retail area development and socio-spatial segregation in provincial towns (Chapter 6)	• All changes related to road network, such as new road/bridge construction • Urban land use changes • Peripheral area development • Large-size and self-contained urban projects, particularly gated communities • Relocation of government offices/urban projects to periphery	• Road construction and modern planning development policies • Road-oriented development policy (since 1960s) • Market-oriented and free trade policy of global economy, e.g. economic cooperation with Japan for manufacturing and assembling motorcycles and cars in Thailand • Industrial estate promotion policy in rural areas • Public services relocation (to regional provinces) e.g. university, military camp
The process and trend of socio-spatial development of the main retail areas (Chapter 7)	• Emergence of new development areas such as modern shopping centre/entertainment complex, golf course • Modern trade and urban project	• Modern lifestyle and culture • Consumerism • Urban planning policy and its mechanism to demolishing and/or (re) creation • Urban redevelopment • Informality, localism and Traditionalism
The differences characteristics of retail patterns among retail areas (Chapter 8)	• Retail patterns in relations to movement and attraction, e.g. Integration core, location of shops, traffic movement, social interaction	

With the increasing globalisation, modern planning, modern trade and urban lifestyles have altered urban spaces and urban life with spatial centrality shifting away from the existing town centres (Chapter 5), while urban areas have dispersed along new roads out

of town and brought about spatial segregation in some areas (Chapter 6). The dynamic and rapid changes of contemporary urban development were expressed in the life cycles of retail areas through changes in the socio-spatial dimensions in terms of decline-success redevelopment processes and conflicts in public space usage (Chapter 7), as well as socio-economic interactions and socio-economic differences among people using the same urban area (Chapter 8). Therefore the impacts of globalisation on provincial town development could be summarised as related to two main groups of factors linked to the two theoretical frameworks of which the first is the primary focus: 1) the socio-spatial network and 2) the socio-spatial political economy (Table 9.1).

The socio-spatial network effects directly links to physical changes such as road cutting and urban land use transformation. Numerous studies using the spatial configuration approach revealed that the dispersal urban expansion caused by changing and increasing road networks had caused significant impacts on town structure, particularly on spatial centrality shifting in some areas (Medeiros et al., 2003; Al-Ghatam, 2003; van Nes, 2001). Out-of-town self-contained urban projects such as military base camps, golf courses and factories were also found causing fragmented urban land use and discontinuous road networks.

According to the theory of natural movement, complex social relations among the main variables, which are spatial configuration (spatial properties), movement (traffic) and attraction (land use), embedded in urban space, stem from the spatial configuration of urban structure itself (e.g. Hillier and Hanson, 1984; Hillier, 1996b; Hillier, 1999b). The analysis of this study reveals that, firstly, the centre of spatial centrality of the towns had changed in relation to the 'live centre' or main retail area of each period (Chapter 5). This meant that spatial centrality of the case study towns was related to the towns'

attractions by their road networks and land use consideration. The most recent surveys of retail patterns found the prime location of the town centre or main retail area of each town was closely linked to the road with the highest accessibility level (of Integration degree) when compared to other retail area locations. Secondly, the statistical correlation analysis revealed that there were clearly relationships between spatial configuration and movement.

The processes of urban development were shaped also by the socio-spatial political economy in this case study Thai provincial towns. The spatial political economic dimensions were hidden behind the spatial theory (Lefebvre, 1991; Lefebvre and Nicholson-Smith, 1991), as urban planning policy directly influenced the spatial network changes. Despite the loose control of urban planning in provincial towns (e.g. Glassman and Sneddon, 2003; Maneepong and Webster, 2008), urban change in this study was clearly the result of development policy from central government, particularly in terms of the road-oriented approach. The analysis in Chapter 8 clearly stated that motor-vehicles were promoted by national economic and planning policies (Christopher and Phongpaichit, 2005) and these had a behavioural effect on the provincial case study towns, including the emergence of dispersed urban expansion. Government policy influenced by globalisation influenced changes in patterns of consumption and daily lifestyle (Rigg, 2003; Hackenberg, 1980). Changes in large urban land use were also caused by government policies, including the relocation of public institutions and public land use. There were an increasing number of large-scale self-contained urban projects such as golf courses, factories and modern shopping centres and these generated increased spatial segregation, socio-economic differences and conflicts within community as shown in the case study towns.

This pattern of socio-spatial political economic development has resulted in critiques of inappropriate development practices and policies in provincial Thai towns (Pattana-Anek, 2000) with increasing urban injustice and socio-economic differences in these communities. The policies dealing with low-income properties in each province showed that the urban planning process was not inclusive in relation to consulting with less powerful local social groups. The first example was slum clearance on the waterfront area of Nakhon Nayok, to create a large concrete paved park with a fence and entrance gate (see Figure 8.8 in Chapter 8). The impact was an obvious top-down urban management policy of destruction and (re)creation (Brenner and Theodore, 2002), which neglected social interaction in urban spaces. Another example of this type of development policy was the flood dyke construction that only protected the main town centre. The dyke or flood prevention wall was constructed along with the new road, elevated 1-2 metres from the ground level, which made the lower area difficult to access and led to decline (Figure 7.7 and 8.8 in Chapter 7 and 8).

ORIGINAL CONTRIBUTIONS TO KNOWLEDGE

The original contribution to knowledge of this thesis has several dimensions. The different impacts of globalisation have been studied primarily in major cities while there has been less research done in small to medium-sized provincial towns (van Leeuwena and Rietvelda, 2011; Bryce and Joint Center for Political Studies (U.S.), 1977), and little focusing on retail development in particular. This case study addresses this gap.

The aim of this research was to analyse urban changes in retail development as part of the processes of globalisation, in terms of spatial configuration, political economy, and user retail patterns, linking global concepts to local realities in a Southeast Asian

context. Consequently, three medium-sized provincial town centres in Thailand were selected to be representatives of urban transitional areas in the context of global South where there were loose regulatory frameworks and planning policies for retail urban development.

There are several original conceptual contributions to knowledge of this research. The findings of this study extend the understanding on the impact of globalisation in terms of the confronting local and global aspects of retail area development in global South. It reveals the dynamic complexity of the processes of urban development through the case study of three provincial Thai towns.

First of all, there was a lack of some fundamental concepts of urban development generally present in developed countries in the socio-spatial context and urban change experience of the developing world as Roy states *'First World models and Third World problems'* (Roy, 2005, p.147). This study makes an argument for the importance of local context and theories relevant to the global South where there is rapid urban growth with poorer people (Watson, 2008; Robinson, 2013; Parnell and Robinson, 2012). Consequently, the conceptual framework of this research was primarily developed from the concepts of spatial configuration in architecture and urban design and secondarily from the study of the spatial political economy. The research framework brought these two conceptual approaches together. By using only one of them, it would not have been possible to illuminate the complexity and dynamic relationships of the process of urban expansion in this setting. The research design thus employed multi-disciplinary approaches and a rigorous methodology to deal with the complex social and physical dimensions of urban change in the context of global South.

This research was designed to find a new integrative way of viewing the available data to study the real-life situations and complexity of urban changes. A mixed method design was used to study urban development in the context of provincial towns that often have inadequate and inconsistent data available. The context-oriented mixed method approach combined three types of data; physical urban development, spatial configuration, and behavioural data. The concept and methodology of spatial configuration analysis using Depthmap from space syntax is advantageous in terms of providing reasonable practical systematic programming for the built environment and socio-spatial impact studies. The research also developed the careful consideration of spatial segregation even with limited data to reveal the imbalance between physical development and public use of urban space.

The integration of spatial configuration analysis and a political economic approach in this research has extended understandings of the impact of globalisation in relation to retail development in the context of global South using provincial Thai towns as being representative of rapid and uncontrolled urban change. It reveals that globalisation is not a static process but has a rather more complex dynamic in the context of global South as suggested in literature (Roy, 2005; Parnell and Robinson, 2012). According to the political economic background of Thailand, even though the nation is categorised as a democratic state, it has long been critiqued d as having weak democracy and favouring a patron-client system in both policy and practice (Athiwanichayaphong, 2009). This has consequently shaped the specific condition of partial capitalism under feudalism which has been susceptible to corruption and top-down planning.

The findings of this study also express the recent local-global tensions in terms of modern policy in urban economic retail development. Numerous publications state that

global trade is an important factor influencing the economic structures and impacting on urban development policies worldwide (e.g. Medeiros et al., 2003; Al-Ghatam, 2003; van Nes, 2001) particularly in terms of the spread of global multinational trade strategies in retailing in provincial towns in local non-western settings. For example, the penetration of modern trade in town centres or out-of-town areas has been widespread. This adaptive strategy has affected the survival of older/traditional retail areas and has fostered more segregation in urban retail development, which has promoted socio-economic differences and occasionally generated social conflict at the local level. This finding supports the literature in the field of development in the global South that global trade generates inequality in society particularly in the case of developing areas (Parnell and Robinson, 2012).

Thirdly, the housing index of urban segregation and fragmentation, using the urban definitions of housing in gated communities and government housing estates (Vaughan, 2005; Kozak, 2008) do not necessarily contextually work in small-to-medium provincial towns in the way they do in bigger cities. This research rather found the relationship among the degree of spatial segregation, socio-economic differences, and detached housing. Finally, in terms of spatial configuration analysis, a fundamental of space syntax includes a general practice on the division of transportation mode which follows the universal western rule of separating vehicles and pedestrians into different categories. However, this rule could not be applied in the context of provincial Thai towns where motorcycle usage including para-transits such as rickshaws which fitted into neither groups but was extremely important and widely used throughout the areas.

This thesis reviewed and explored the processes of retail area development in three Thai provincial towns with weakly regulated planning policies. There has been a lack of previous research and attention given to medium-sized towns, which are scattered and cover over half of the country. Many of them will grow into large cities in the future and therefore it is vital to understand and explore these towns contextually in terms of their urban growth and changing forms over time. The research results extend empirical understandings of the contextual patterns, characteristics and trends, particularly in relation to spatial configuration and changing retail patterns. The life cycles of retail centres have been revealed as having three main retail periods with diverse patterns in the last period influenced by globalised trade developments. The approach and findings could be generalised to other medium-sized towns in the country and the wider region of Southeast Asia where rapid urban development in provincial areas are similar.

Urban segregation as a trend of globalisation and modernisation has been studied mostly in large-cities. This research therefore focused its attention on the significance of the early spatial segregation processes in medium-sized provincial towns. The spatial segregation and socio-economic differences as evident in the case study towns could be compared to any other towns in global South context, which may lack effective planning and policies to guide their sustainable growth. This should particularly benefit the Southeast Asian countries where many social, economic, cultural and geographical characteristics are commonly shared.

The traffic movement patterns of pedestrian and vehicle are conceptually different and should be separated, at least during data collection. In the field survey, motorcycle usage in provincial towns was a way to access both pedestrian and road designated areas due to its ability to navigate narrow alleyways in old town market and highways. This

characteristic can also be found across Southeast Asia (Christopher and Phongpaichit, 2005) (see Figure 8.13 in Chapter 8). The correlation between accessibility (i.e. Integrations from spatial properties) and movement rates also strengthened the validity of the findings, by which the levels of relationships in the case study sites were significantly increased when the numbers of motorcycle users were regrouped and placed into the same category as pedestrians. It thus suggests that regrouping of data according to the study context is important and that the application of space syntax analysis in provincial towns, particularly in relation to movement characteristics, requires significant adjustments in consideration of the local context.

LIMITATIONS OF THE RESEARCH

There are a number of limitations to this research. The data collection was impeded by the unavailability of important documents and secondary data such as maps, historical and statistical data, due to the poor condition of archiving in Thailand, which could also be the case in other developing countries.

The process of primary data collection was planned to systematically record the details of economic and social activities and traffic movements in public spaces by sampling one weekend and one weekday, five times a day, and setting up to finish in one hour at every observation post (Chapter 3). However, the amount of information required at each single moment was never meant for a sole researcher; the fieldwork team thus consisted of one principal researcher and four assistants. Despite several trials and training prior to the actual data collection, there was limited inter-rater variability. The site boundaries of the retail behaviour and traffic movement surveys were within the busy retail areas, in which unexpected things could happen.

The boundaries of the surveyed sites were also selectively framed, using the highest concentration of retail activities as a centre according to contextual appropriateness, the judgment of the principal researcher and the time limitations of the fieldwork. The peripheral areas surrounding the (mostly out-of-town) new development areas therefore could only be roughly surveyed, mostly by in-car photography and interviewing a few local people to gain a bigger picture of economic structure formation at the local scale of the whole town.

The timings of data collection were during March to May 2011 for the main observation, and January 2013 for the post observation. About half of the main data collection was in the summer semester break in Thailand, and therefore the amount of traffic movement related to school and school children's activities might be considered unstable during the three-month survey period. However, it did not affect the questionnaire surveys since all respondents were over 18 years old.

In terms of respondent numbers, the questionnaire survey received 446 responses from the nine sites of the three case study towns, which might be considered as too small for a more reliable statistical analysis, but in this research it only played a supportive role and should be considered as acceptable for significantly linking to other parts of the information and analysis.

IMPLICATIONS FOR TOWN DEVELOPMENT AND PLANNING REGULATION IN THAILAND

Considering the political economic aspects of this research, globalisation influences the urban retail development process through planning in relation to policies and practices. The findings of the research have addressed the importance of urban development

policies, such as those relating to roads and markets- which influence socio-spatial transformation.

Urban development policy of Thai government has often been criticised for being strongly influenced by a set of standards transferred from developed countries in order to modernise the country to be part of global system (e.g. Usavagovitwong, 2012; Pattana-Anak, 2000). The construction of new roads, bypasses and road improvements at the periphery of towns are still generally seen as urbanisation, as well as the principal remedies for traffic problems and road injuries in the towns (King Mongkut's University of Technology Thonburi, 2003; Suranaree University of Technology, 2011; 2004). Roads are considered a measurement of development and progress, but there has been a lack of government research on the impact of road construction in the long term particularly in provincial towns, in which many roads split the existing urban structure and break up communities (Dora et al., 2011; Colombijn, 2002). Promoting the use of private vehicles instead of developing efficient and affordable public transportation systems has been an important issue in Thailand (Christopher and Phongpaichit, 2005; Apawatcharut Charoenmuang, 1999) leading to unsustainable urban development (Lynch, 1981; Jenks et al., 1996).

According to the political economic context of Thailand, there has been a system of partial capitalism under feudalism in reality, in which its development policies and practices are often seen as favouring the elite and politicians (Davis and Henderson, 2003; Giles, 2003). Consequently both central and local levels of development policy have been top down lacking consideration of local contexts public participation (Usavagovitwong, 2012; Webster, 2002; Damrong Rajanuphap Institute and Provincial Administration Development and Promotion Bureau, 2008). This centralised

implementation of policies has also discouraged local government agencies from adapting developments to benefit the local context, and this is the case of most countries in Southeast Asia (Maneepong and Webster, 2008; Webster, 2002). The municipalities often work to correct the short term problems as they arise rather than planning for future developments to handle further rapid urban growth.

The static and out-of-date planning system has brought about some increasing disagreement and inequalities in urban society particularly in town centres as this research has revealed. On the one hand, modern retail developments represent the progress of global economic development, even in rural and remote areas. On the other hand, modern economic expansion may generate conflicts and protests in relation to its impact on the local economy and social cohesion. At present, the marketing strategies of multinational brands and modern businesses are reaching out to every customer group of all areas, supported by capitalist policy from governments that promote higher profits for investors while overlooking the social and environmental impacts. In this research, local retailers of some case study towns had protested the penetration of modern trade in the town centre, causing tensions at the local level between multinational/national investors and small local retailers. Conflict issues of trading areas and retail activities at the local level may require intervention in the future from local or national government to strengthen the regulatory planning framework.

This research has highlighted the importance of a contextual approach in the development of a conceptual framework for urban planning in the global South that should receive more attention in terms of provision for future development (e.g. Parnell and Robinson, 2012; Ong, 2011; Watson, 2008). Findings of the study suggest three important dimensions of local retail behaviour in the provincial town context, which are

informality, localism and traditionalism. These aspects create the characteristic/identity of place in terms of physical, socio-spatial, and political economic relations which need to be included in the planning process. For example, the analysis of movement patterns suggests that the existing public transport systems do not support the realities of traffic patterns in provincial town contexts (Chapter 8). Mass transportation such as public buses may not fit in the local context of provincial towns and thus more flexible para-transits, such as taxi motorcycles, rickshaws and pooled taxi/mini shuttle buses, have become successful and permanently used in many Southeast Asian countries (see Figure 8.13- below in Chapter 8).

Spatial configuration analysis using space syntax in the global South needs to reconsider the informality and traditionalism, such as characteristics and categorisation of traffic movement. Motorcycles including some types of para-transit such as rickshaws could not be simply categorised as motor vehicles in the context of provincial towns in Thailand, as well as in many other Southeast Asian and developing countries, because the way they are used brings them closer to the way in which pedestrians move. The study revealed clearly that statistical correlation of both pedestrians and vehicles was significantly higher when motorcycle data was regrouped to join pedestrians. Recently in many areas of Thailand, there are trends of localism and urban conservation of inner cities and provincial towns, some of which are successful in protecting localities, by forcing the city hall to issue a retail protection and modern trade control law. Contrary to the locality movement, the Retailing Act drafted in 2000 has still not been issued by the central government due to pressure from abroad, particularly from multinational retail investors (Economic Reporter Thairath, 2012). More recent versions of national development plans have been more progressive on local issues and therefore

some redevelopment and urban regeneration projects of important historical areas are being promoted (further details provided in Chapter 7), with the potential for development into tourist attractions.

The implications of the research reveal the complexity and dynamic relationships of the process of urban expansion which result differently in different conditions. The deterministic relationships between space and society thus might not be possible in the context of global South. Therefore, it is important to reconsider before applying theories which need further development and integration in their implications.

FUTURE RESEARCH ON PROVINCIAL TOWNS

This research was based on quantitative data related to spatial configuration as the major approach. Some evidences particularly on qualitative data found during the field observation were therefore transferred into quantitative form, in which the process was time consuming and sometimes reduced interesting details of the data, such as the variety in patterns of social interaction in public urban space. It is thus worth to note here for further possible balancing on qualitative data in the future research.

Spatial configuration analysis using space syntax software is an accurate and rigorous scientific approach with quantitative data sets and is recommended. However, the overall process consists of many stages and requires some specific supporting data sets which are time-consuming. It should also be noted that space syntax has developed and launched many different software versions for different purposes of usage. The latest software such as Confeego has been updated and re-launched many times in a short period, and some software versions need registration repeatedly as it is a trial-version. Consequently, someone who is interested in this research approach should give a

considerable time to data processing as well as empirical observation in the field. The researcher recommends the basic software at the beginning which has been prevalently used such as Depthmap, as applied in this research but after finding the troubles of software error from using Confeego.

Furthermore, the issue of the connections between economic strength and the degree of segregation was one of interesting aspects found during the process of data analysis. Theoretically, spatial segregation is not only reflected in social division and segregation, but also the weak economic condition of an area (van Nes, 2007; Hillier, 1999a). This research study focused on the socio-spatial dimensions of major retail areas of the town centres. However, according to time limitations, the issue was surveyed briefly in out-of-town centres. Even though the survey led to the conclusion that these sub-centres were usually inferior in terms of their economic development compared to the town centres; it is an area of possible future research.

Recently the issue of locality in Thailand has been focusing on tourism and urban regeneration, in many retail areas of provincial towns. For example, the architectural conservation project and cultural tourism promotion of the river-based settlement in Amphawa of the central region, and the urban conservation of shophouse communities and establishment of annual celebration of Phuket Old Town in the south of Thailand. The significance of locality became more clearly evident during the post observation survey in January 2013. The extension of the life cycles of these older areas by improving their physical conditions or changing their functions is one of the most recent popular models in urban planning policy. However, in many cases the old residents had to move out as part of the redevelopment process, or were gradually being pushed out by affordability factors when the areas became too popular and increased competition

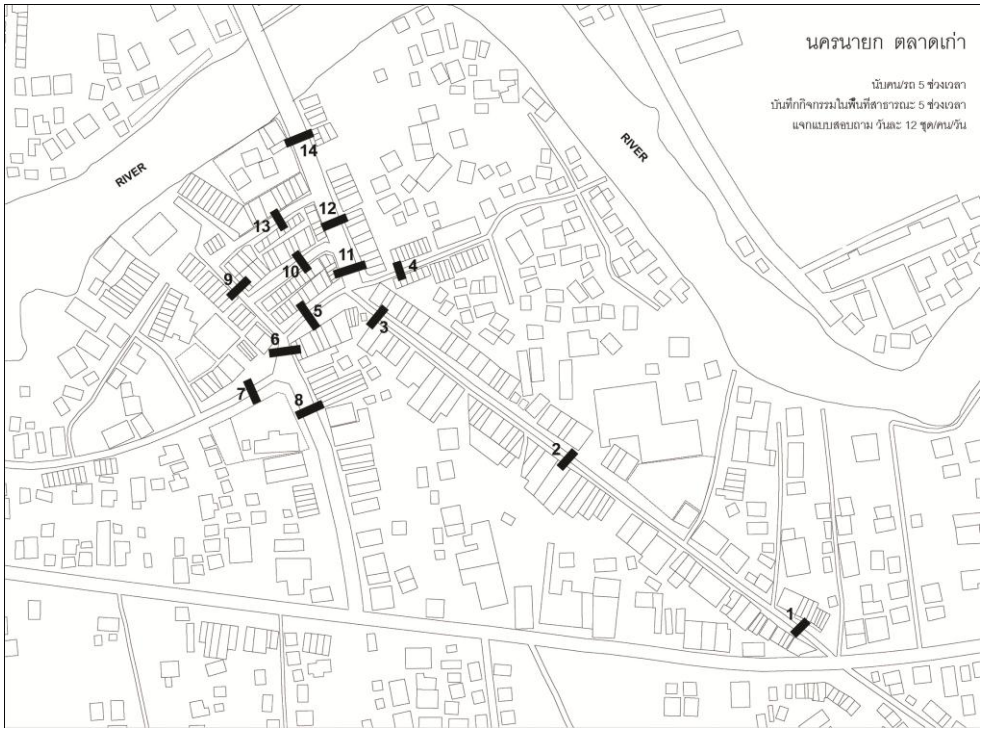
among investors. These projects were then criticised since they did not meet one of their main objectives of improving the residents' quality of life and well-being. In most cases the local way of life, which was related to the existing socio-spatial structure and people's activities in it, seemed to disappear quietly without being questioned. Future research on urban changes in provincial towns in Southeast Asia could closely analyse urban redevelopment or regeneration projects and their impact on the social context.

Lastly, urban developments in the context of global South, particular countries in Southeast Asia, share a number of similar characteristics, not only in terms of socio-spatial and political economic structure but also informality, localism and poor planning databases. The mixed methods approach and forms of measurement of this study could be applied to research other provincial towns in the region with the aim of contributing to sustainable contextual development in urban design and planning.

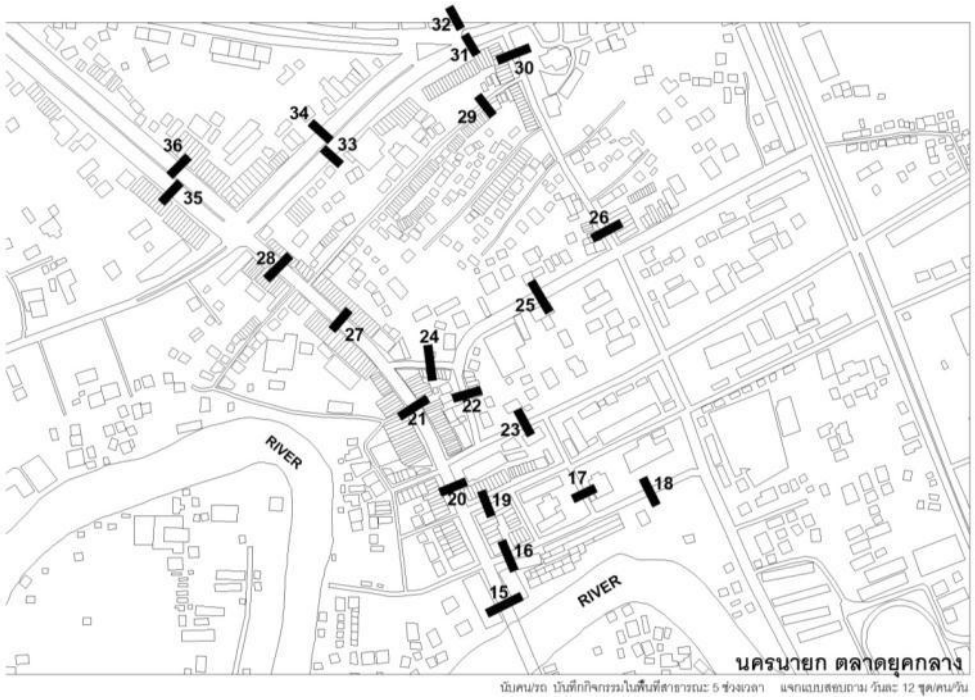
APPENDIX

APPENDIX A: GATE POSITION

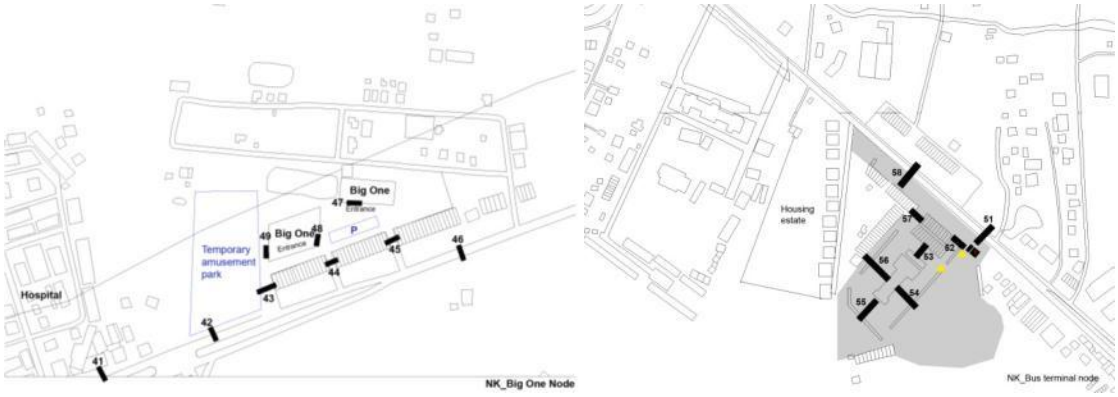
Figure A.1 Gate positions of Nakhon Nayok



The first-period retail area

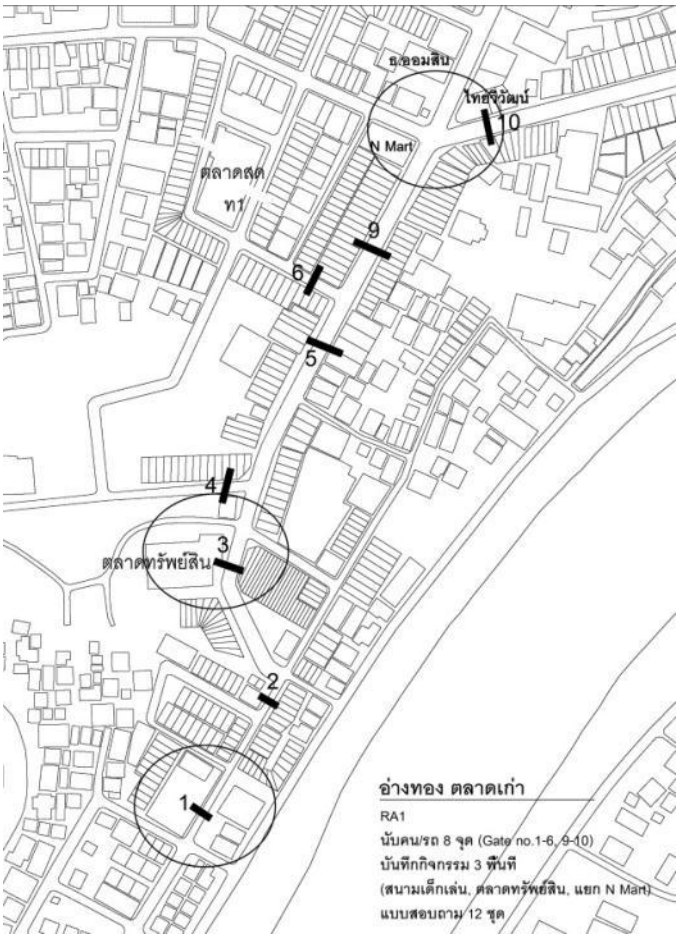


The second-period retail area

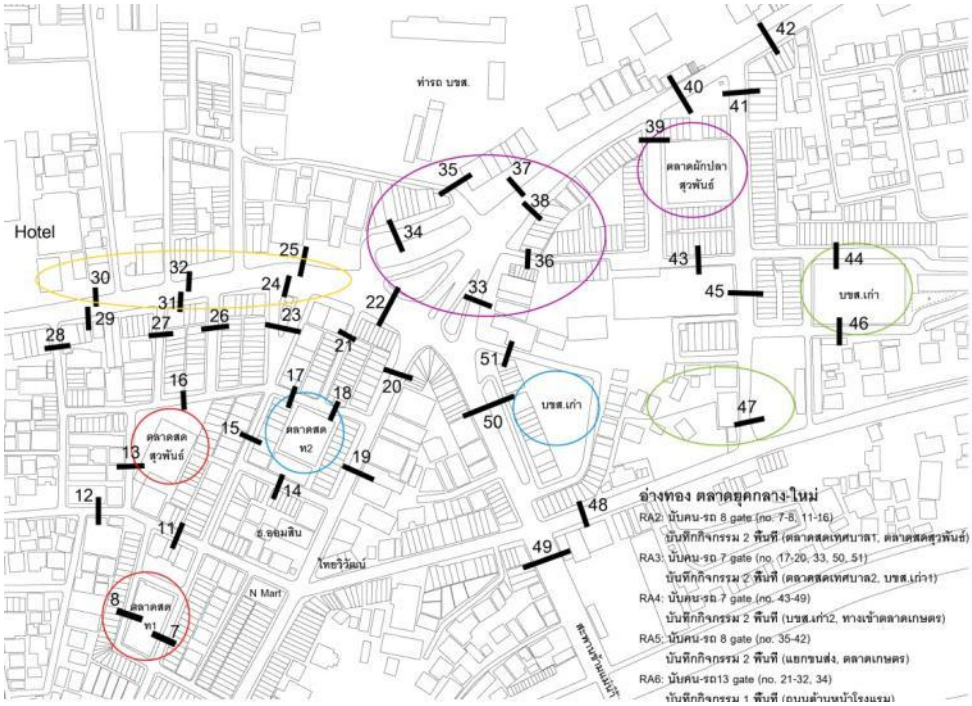


The transition retail areas

Figure A.2 Gate positions of Ang Thong

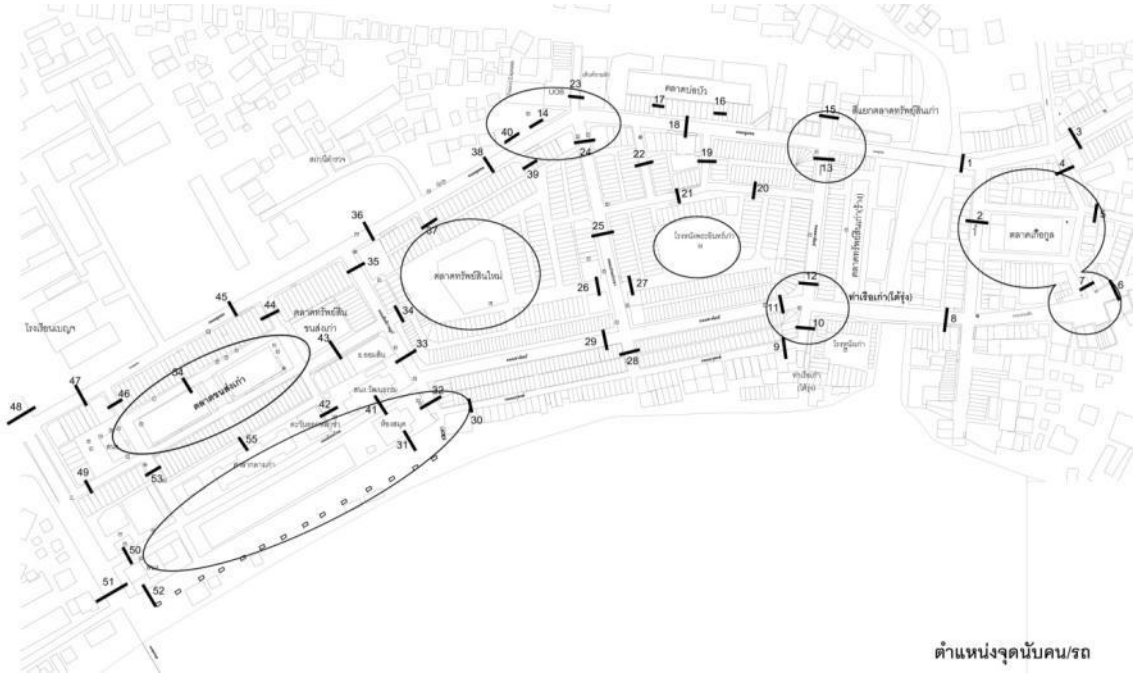


The first-period retail area

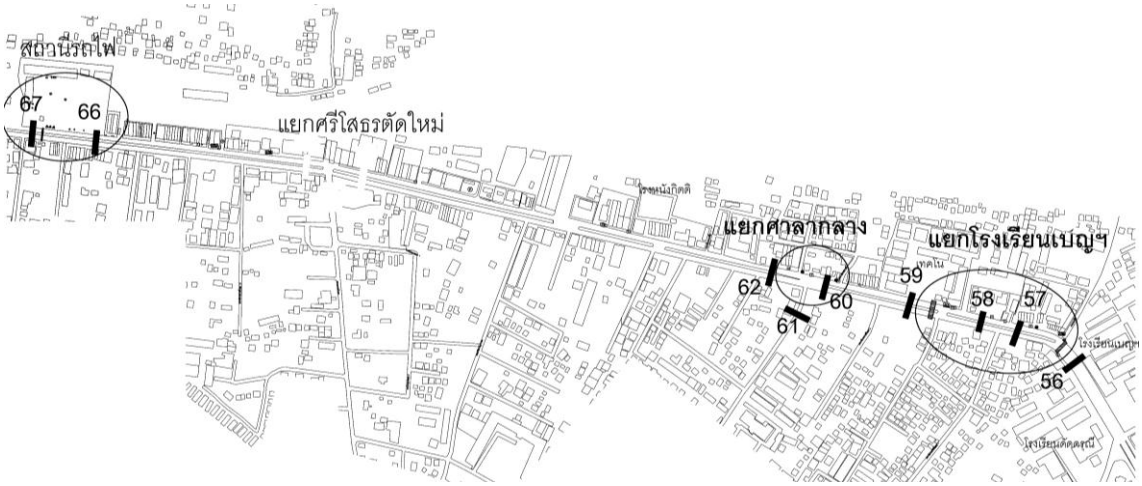


The second-period and expansion retail areas

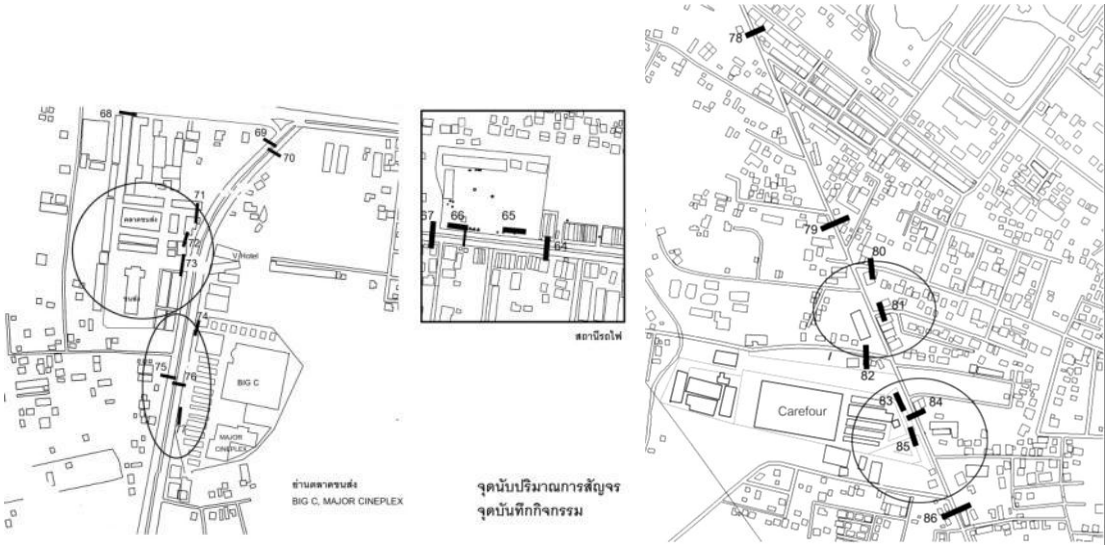
Figure A.3 Gate positions of Chachoengsao



The first- and second-period retail areas



The transition retail area



The third-period retail areas

APPENDIX B: TRAFFIC RECORD FORM

TRAFFIC RECORD FORM

☐ 7:00-8:00	☐ 10:00-11:00	☐ 12:00-13:00	☐ 14:00-15:00	☐ 17:00-18:00	NAME…… WEAKDAY / WEAKEND	DATE…… TIME……

GATE NO.	VEHICLE						PEDESTRIAN			
	BICYCLE	MOTORCYCLE	CAR	BUS	TAXI	SERVICE VEHICLE	CHILDREN	ADULT	ELDERLY	MERCHANT

APPENDIX C: QUESTIONNAIRE SURVEY

THE UNIVERSITY OF WARWICK

Full title of Project: Spatial centrality and shopping patterns in developing countries: the case of Thai provincial towns

For surveyor only
Surveyor name.....
Date.....
Site: NK ANG CHA
□ No.1 Market zone
□ No.2 Market zone
□ No.3 Market zone.....
Time.....

Questionnaire

This research aims to investigate why some town centres face economic decline while the city or town itself is growing and prospering.

As a part of this, questionnaire survey is also carried out mainly to know more about the users of this shopping zone. You are invited to take part in a questionnaire survey if you are a regular user of this shopping zone. Questions in this survey is about your general shopping pattern and frequency. The questionnaires would only take around 5 to 10 minutes to complete.

All information collected will be kept strictly confidential and anonymity will be ensured in the collection, storage and publication of research material.

I am a lecturer at the Faculty of Architecture and Planning in Thammasat University, and this research is funded by the Royal Thai Government. However I am conducting this research independently as a PhD student at the University of Warwick.

First of all, some questions about your visit to this shopping area and how often do you visit here.

1) Where do you normally shop?
□ Here
□ Others, please identify _____

2) What types of products do you buy or services do you use here?
□ Fresh produce without services
□ Eating and entertainment with service
□ Grocery
□ Clothes, fashion
□ Health and beauty
□ Goldsmith, jewellery
□ Baby and toy shop
□ Electricals and vehicles shop
□ Education, book store
□ Home and decoration
□ Agricultural and occupational equipment
□ Bank and private services
□ Public utility and non-profit organisation
□ Religion and belief
□ Mixed types

3) Roughly how many times per week do you visit here? _____times /week

4) Average spending on shopping here per week? _____Baht/week

5) Roughly what are the reasons for shopping here?
□ Variety of goods
□ Good quality
□ Price
□ Negotiable
□ Modern style of management
□ Place (clean & neat)
□ Walk& select goods yourself
□ Relation with the retailer
□ Easy to access

- ☐ Car parking available
- ☐ Close to school, work place, etc.
- ☐ other, please identify_____

6) How much time do you spend here? _____minutes/time

7) How do you usually travel to this shopping area?
- ☐ Public transport
- ☐ Taxi, motorcycle service, Tuktuk
- ☐ Personal car
- ☐ Motorcycle
- ☐ Bicycle
- ☐ Walk
- ☐ Other, please identify _____

8) Approximately how much time does it take to travel here from home? _____

9) Approximately how far is home from this shopping area? _____Km

10) Which residential type is your house?
- ☐ House in gated community/ housing project (own)
- ☐ Stand-alone house or shophouse (own)
- ☐ Rental house/apartment/dormitory
- ☐ Rental unit in governmental housing
- ☐ Other, please identify _____

Now a few questions about yourself

11) Gender
- ☐ Male
- ☐ Female

12) Age _____

13) Occupation
- ☐ Employed full-time (more than 40 hours a week)
- ☐ Employed part-time (less than 40 hours a week)
- ☐ Self-employed/freelance
- ☐ Unemployed/seeking work
- ☐ Retired
- ☐ Looking after family/home
- ☐ Full-time student at college/university
- ☐ Other

14) Education
- ☐ Lower primary school
- ☐ Primary school
- ☐ Secondary school
- ☐ Higher education

15) Number of members in the family _____

16) Family income (Baht a month)
- ☐ Lower 5,000
- ☐ 5,001 - 7,500
- ☐ 7,501 - 10,000
- ☐ 10,001 - 12,500
- ☐ 12,501 - 15,000
- ☐ 15,001 - 20,000
- ☐ 20,001 - 50,000
- ☐ Upper 50,001

Thank you very much for your time and help in filling out the questionnaire

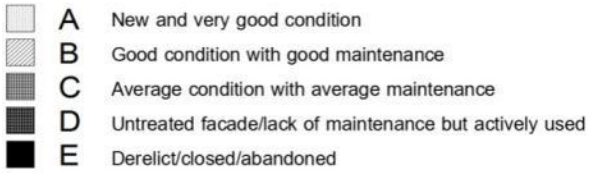
If you need further details of the research, you can ask for the participant information sheet from the surveyor.

APPENDIX D: PHYSICAL BUILT ENVIRONMENT FROM FIELDWORK OBSERVATION

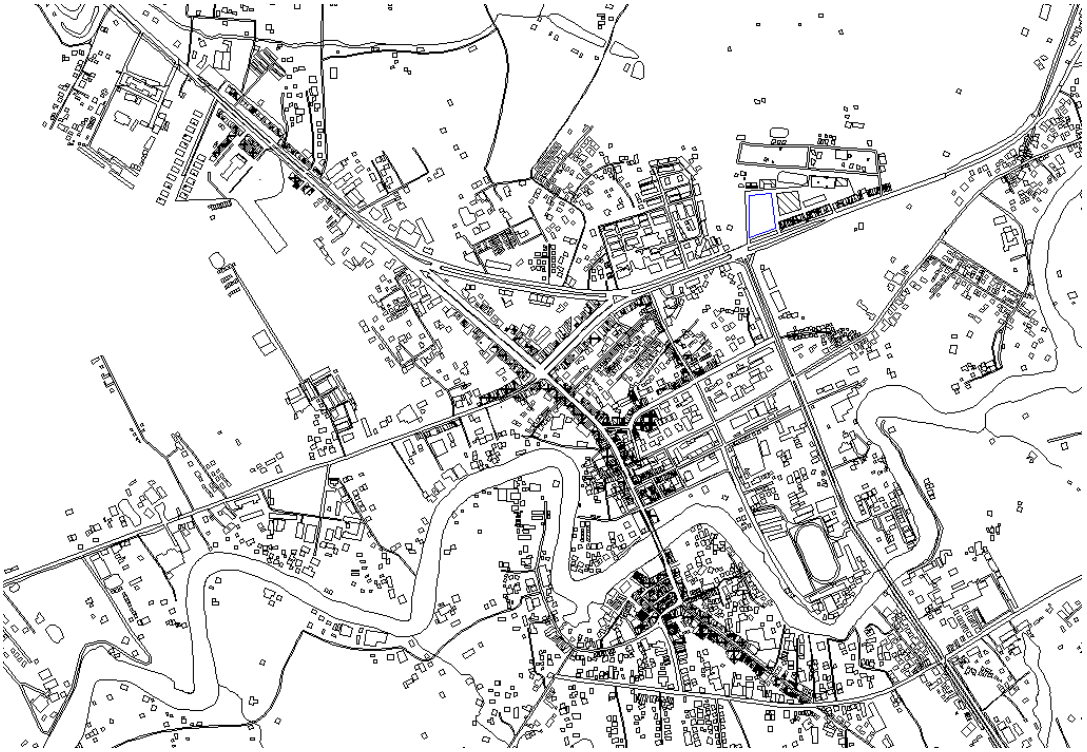
Table D. 1 Observational survey on commercial physical and retail development by periods

		NAK						ANG						CHA					
		1st	%	2nd	%	T3rd	%	1st	%	2nd	%	E3rd	%	1st	%	2nd	%	T3rd	%	3rd	%
number of wet market		1		1		0		0		3		1		1		3		1		0	
parking lots		3		4		1		0		6		13		0		4		5		6	
vacant land		1		1		0		3		0		2		0		1		2		1	
closed building		49	20	40	9	28	15	38	10	48	10	44	8	59	18	109	14	92	17	6	2
house		50	21	43	10	36	19	248	66	136	28	220	42	118	36	152	20	25	5	47	18
commercial		140	59	342	81	123	66	90	24	304	62	261	50	148	46	498	66	423	78	217	80
shops by category	01	8	6	18	5	3	2	4	5	22	7	53	20	9	6	15	3	6	2	0	0
	02	6	4	52	15	14	11	13	15	10	3	14	6	27	18	17	3	49	12	45	21
	03	16	11	33	10	8	6	10	11	66	22	22	9	16	11	49	10	25	6	8	4
	04	6	4	11	3	1	1	3	3	21	7	6	2	9	6	41	8	5	1	10	5
	05	12	9	62	18	10	8	11	12	50	16	45	17	12	8	108	22	51	12	12	6
	06	10	7	6	2	0	0	2	2	8	3	8	3	2	1	17	3	5	1	2	1
	07	1	1	3	1	1	1	2	2	3	1	0	0	2	1	6	1	2	1	1	0
	08	14	10	19	5	5	4	2	2	20	6	24	9	6	4	25	5	30	7	15	7
	09	1	1	20	6	2	2	2	2	10	3	7	3	5	4	17	3	26	6	3	1
	10	11	8	6	2	10	8	1	1	8	3	5	2	10	7	8	2	25	6	22	10
	11	15	11	2	0	1	1	0	0	14	5	14	5	5	4	39	8	5	1	7	3
	12	20	14	81	24	49	40	25	28	45	15	46	18	27	18	78	16	131	31	67	31
	13	1	1	3	1	7	6	5	6	4	1	6	2	6	4	18	4	47	11	3	1
	14	3	2	2	1	2	2	3	3	5	2	0	0	2	1	13	3	6	1	4	2
	15	16	11	24	7	10	8	7	8	18	6	11	4	10	7	47	9	10	2	18	8
trade type	local	128	92	301	88	110	94	75	90	259	85	179	70	135	93	453	94	324	85	28	78
	modern	2	1	35	10	5	4	2	3	21	7	22	9	1	1	19	4	54	14	8	22
	wholesale	10	7	5	2	2	2	6	7	25	8	53	21	9	6	8	2	4	1	0	0
building height	1-1.5	17	7	41	10	25	13	126	29	110	19	111	18	35	11	30	4	83	16	15	20
	2-2.5	158	66	156	36	97	51	251	58	240	41	208	34	273	82	224	29	44	9	5	7
	3-3.5	52	22	197	46	67	36	49	11	212	37	179	29	17	5	436	57	316	63	46	60
	4 up	12	5	36	8	0	0	7	2	17	3	112	19	8	2	78	10	59	12	10	13
building condition	A	3	1	29	7	21	12	4	1	22	6	26	8	1	0	20	3	22	7	14	21
	B	25	12	103	25	38	22	33	11	61	15	80	24	16	6	116	16	96	31	33	49
	C	115	54	222	55	94	55	124	40	246	61	182	55	154	58	491	66	164	52	19	28
	D	57	27	48	12	19	11	114	36	72	18	42	13	81	31	108	14	28	9	1	2
	E	12	6	3	1	0	0	39	12	0	0	2	0	13	5	6	1	4	1	0	0

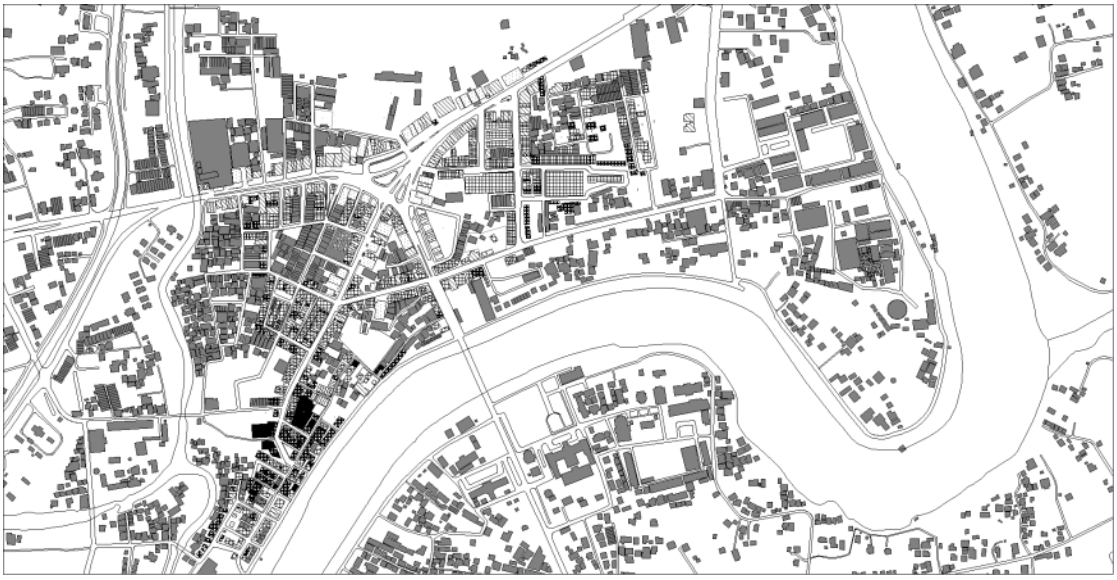
Figure D.1 Building condition



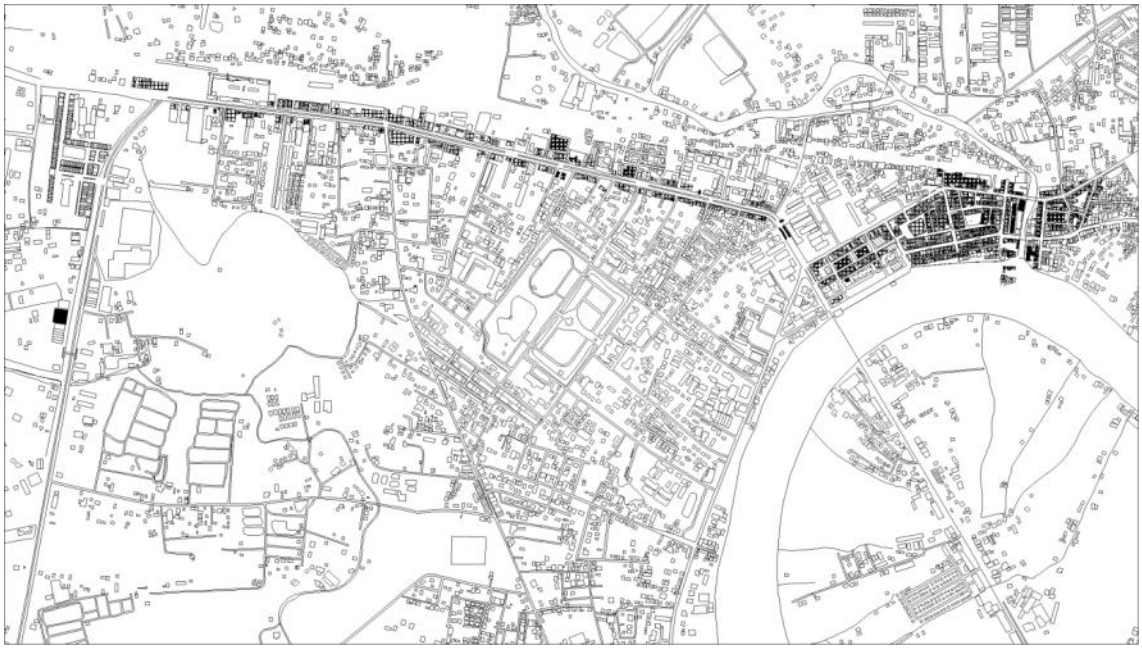
Building condition legend



Building condition survey, Nakhon Nayok

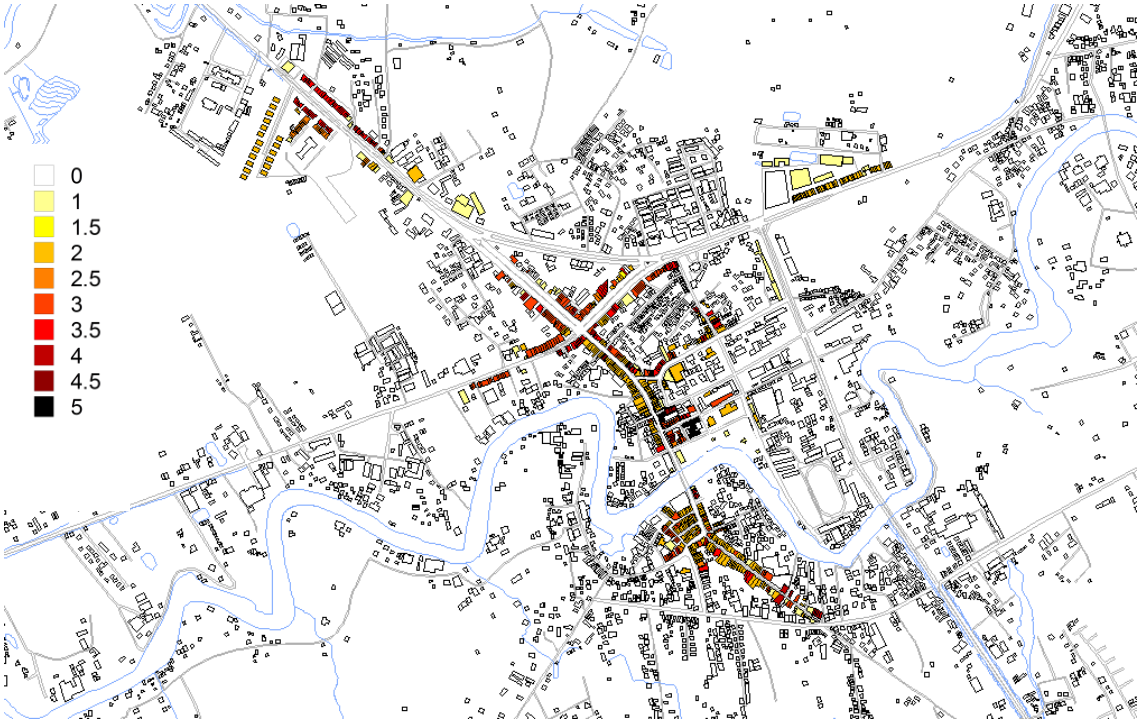


Building condition survey, Ang Thong

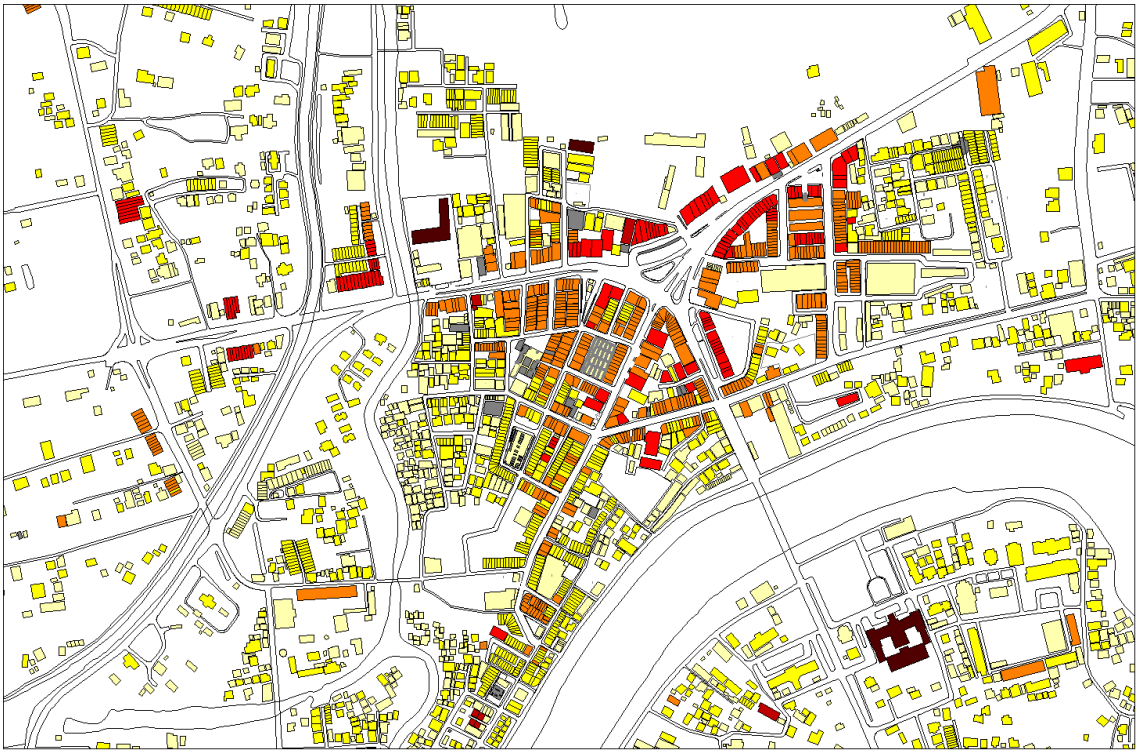


Building condition survey, Chachoengsao

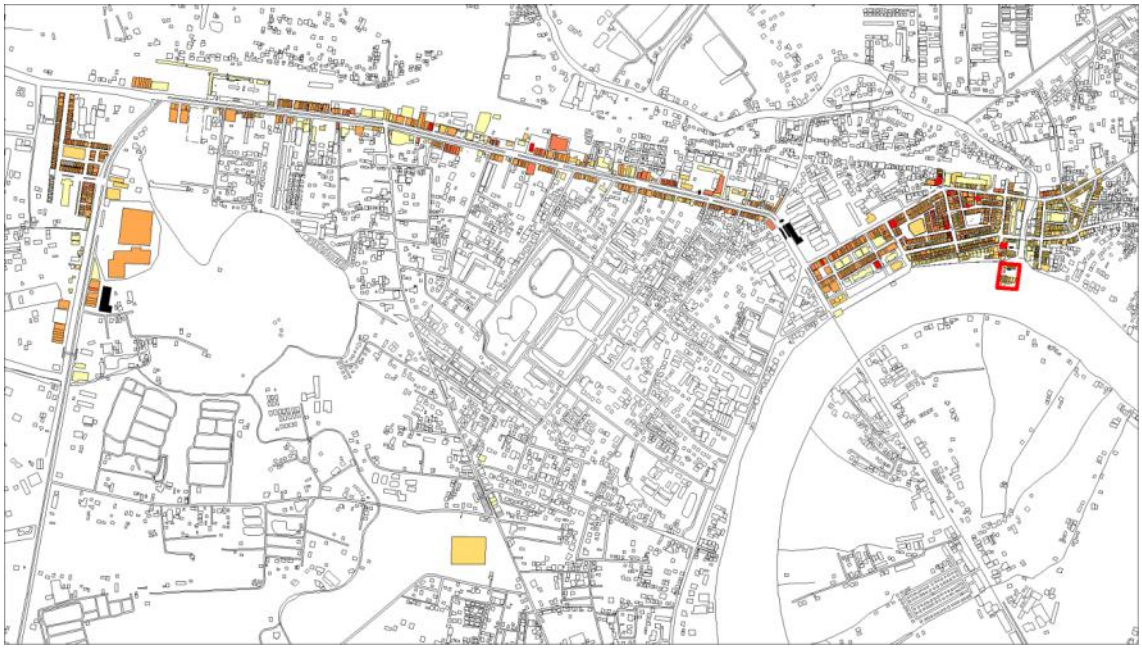
Figure D.2 Building storey



Building storey survey, Nakhon Nayok

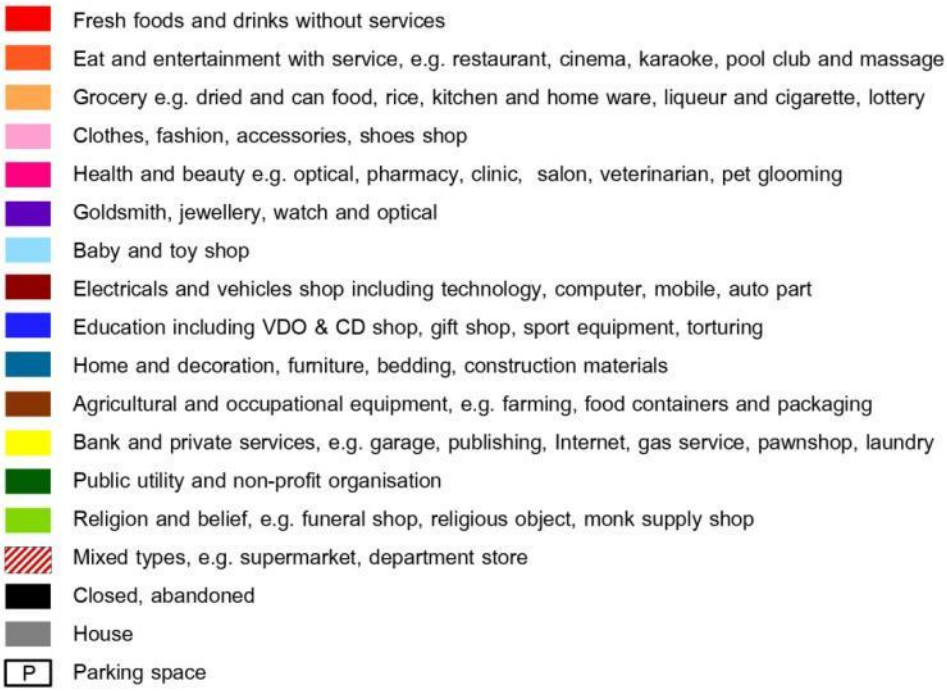


Building storey survey, Ang Thong

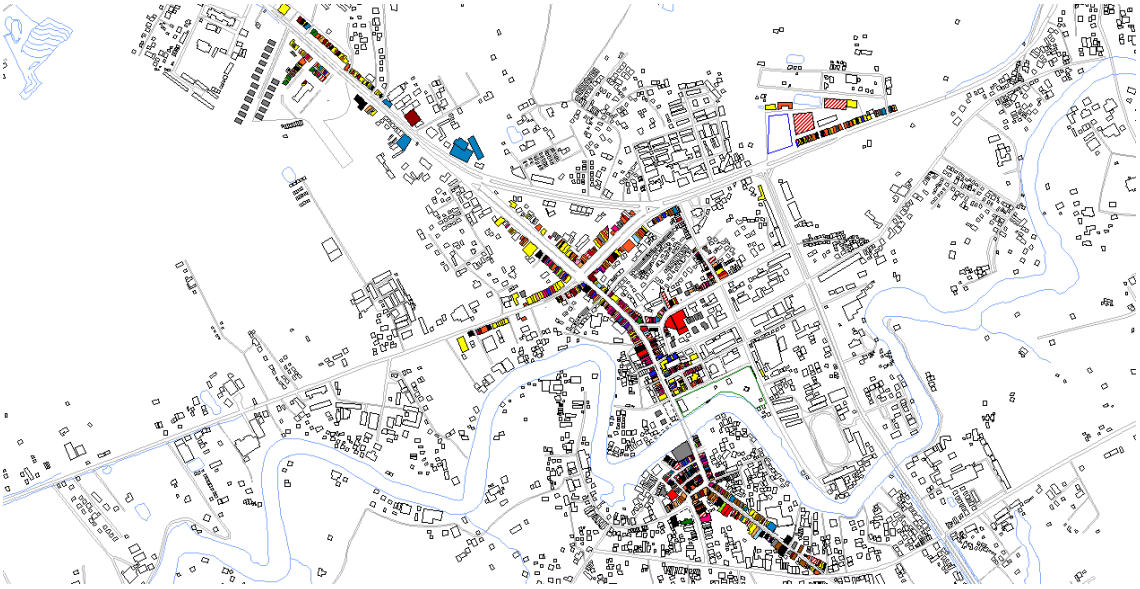


Building storey survey, Chachoengsao

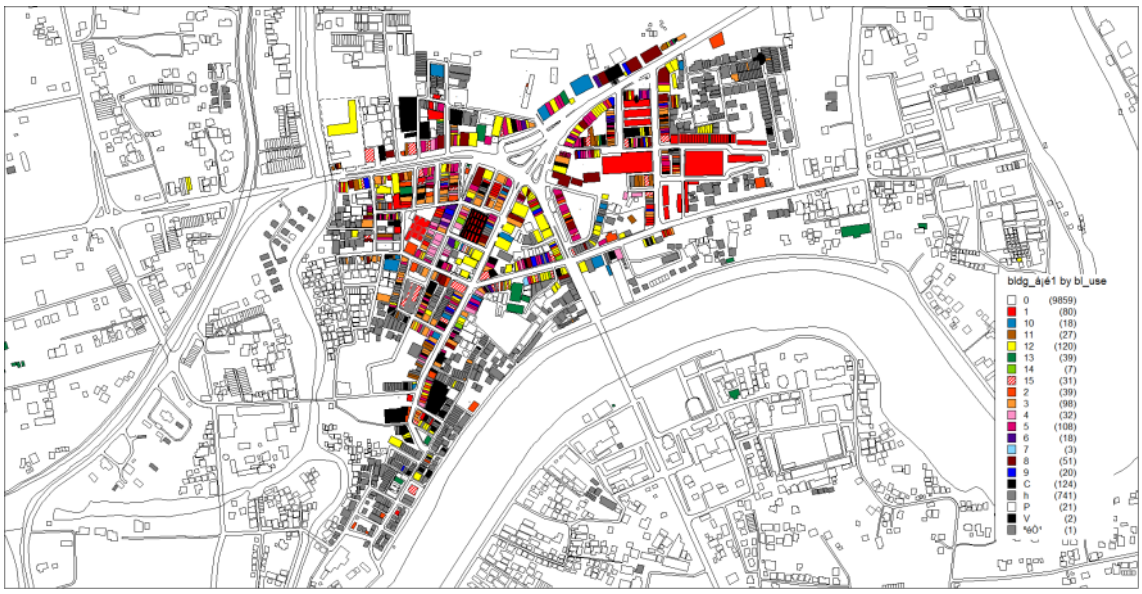
Figure D.3 Shop category



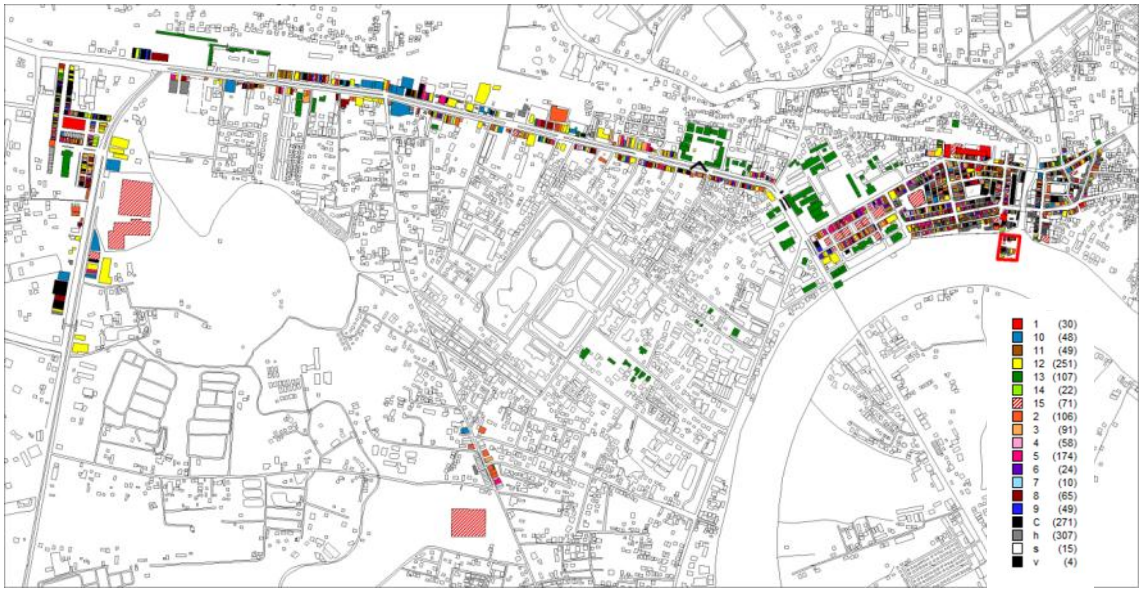
Shop category legend



Shop category survey, Nakhon Nayok

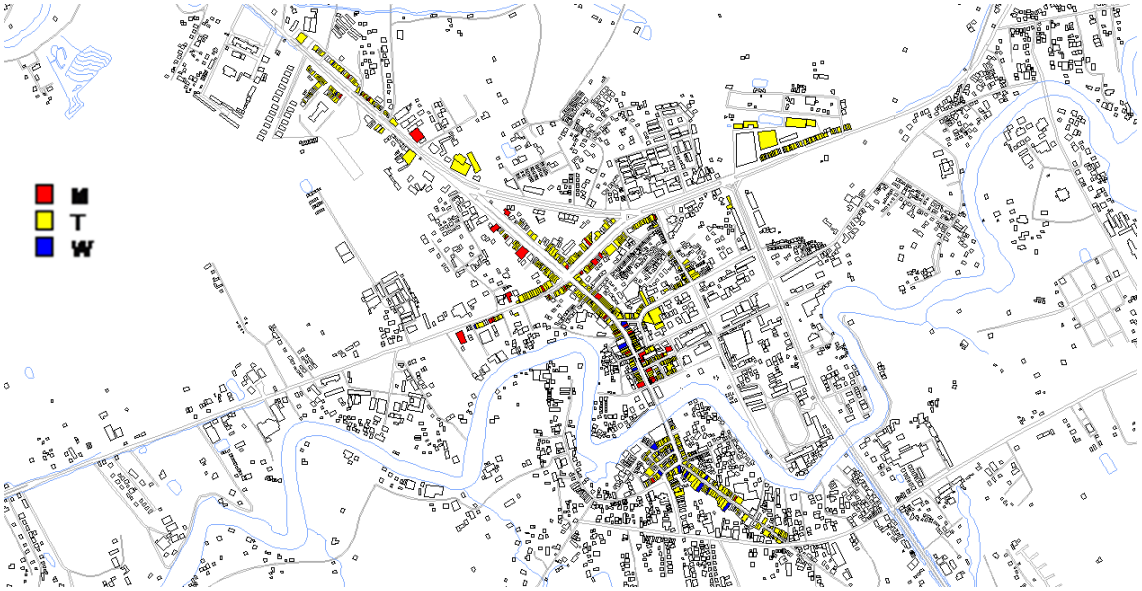


Shop category survey, Ang Thong

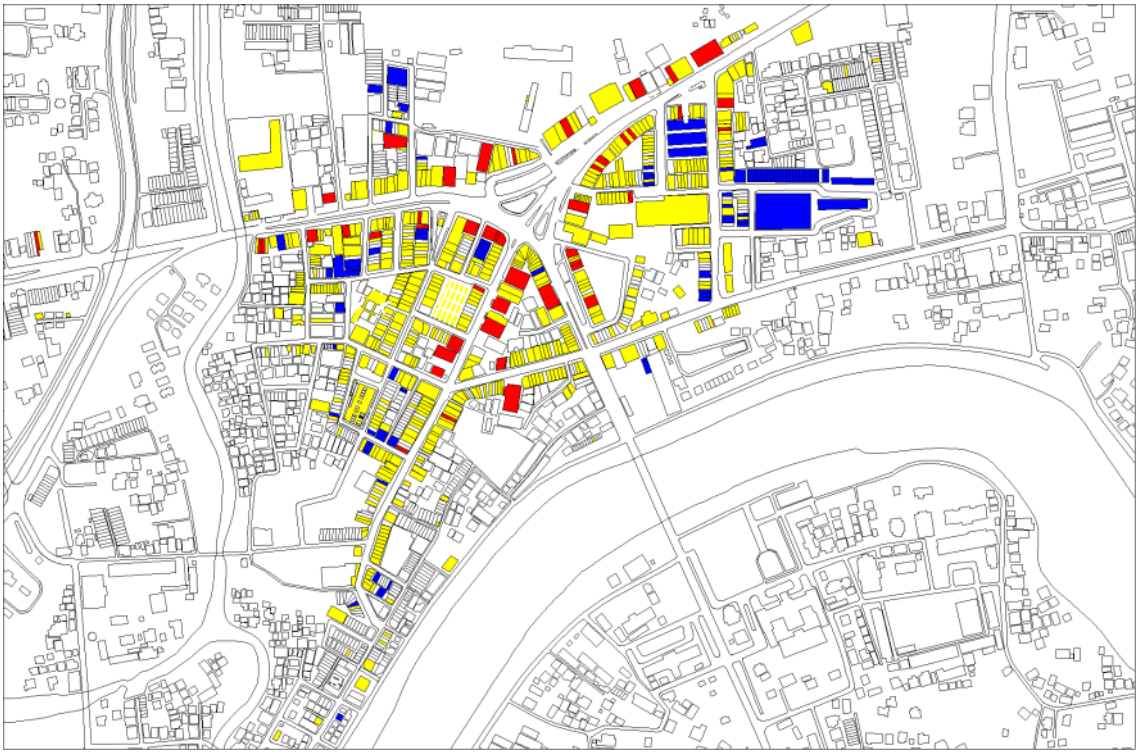


Shop category survey, Chachoengsao

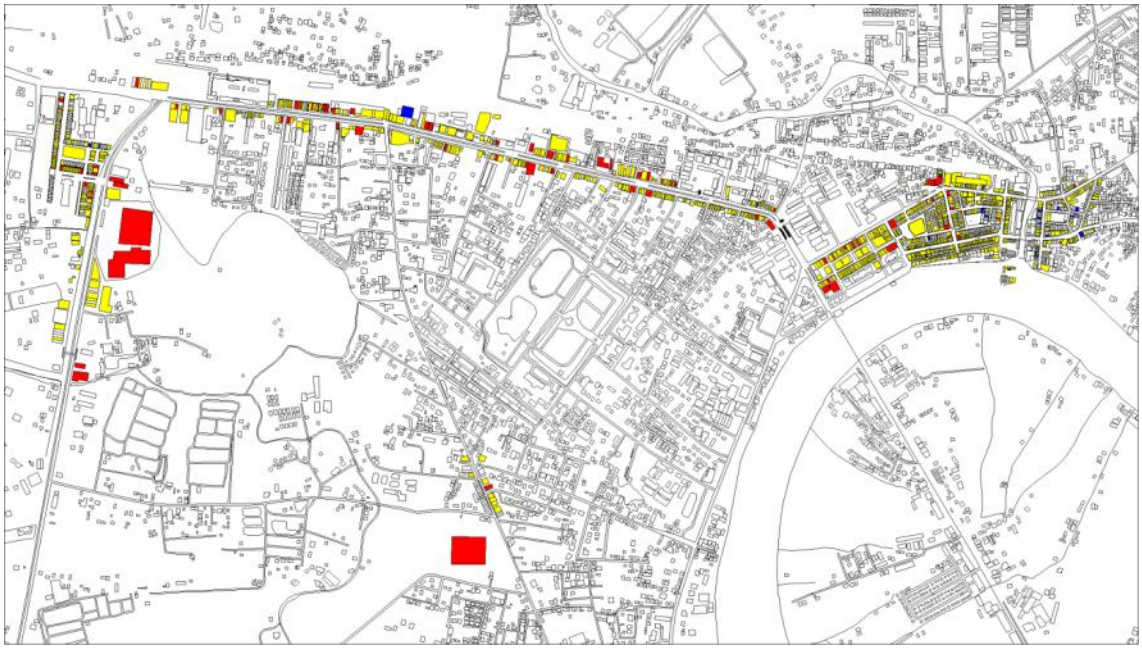
Figure D.4 Trade type



Trade type survey, Nakhon Nayok



Trade type survey, Ang Thong



Trade type survey, Chachoengsao

APPENDIX E: RESULTS OF QUESTIONNAIRE SURVEY

Table E.1 Questionnaire data code

AREA	Area of study (1: 1st retail area, 2: 2nd retail area, 3: 3rd retail area)
REGBUYER	Regular shopping location (0: other, 1: 1st retail area, 2: 2nd retail area, 3: 3rd retail area)
FREQBUYW	Frequency of shopping per week (time/week)
RETAIL	Purpose of shopping (1: for retailing and individual use, 0: for wholesaling and business use)
PRODUCT	Type of regularly shopped product (1: Fresh produces without service, 2: Eating and entertainment with service, 3: Grocery, 4: Clothes, fashion accessories and shoes 5: Health and beauty, 6: Goldsmith, jewellery, watch and optical, 7: Baby and toy shop, 8: Electricals and vehicles shop, 9: Education and bookstore, 10: Home and decoration, 11: Agricultural and occupational equipment, 12: Bank and private services, 13: Public utility and non-profit organisation, 14: Religion and belief, and 15: Mixed types, 99: N/A)
SPENDW	Average spending on shopping per time (99: N/A)
REASON	Reason for shopping (1: Variety of goods, 2: Good quality, 3: Price, 4: Negotiable, 5: Modern style of management, 6: Place (clean & neat), 7: Walk & select goods yourself, 8: Relation with the retailer, 9: Easy to access, 10: Car parking available, 11: Close to school, work place, etc., 12: Other reasons, 99: N/A)
TIMEBUY	Time spent on shopping (minute, 99: N/A)
MODEOFTR	Mode of transport (1: Public transport, 2: Taxi, motorcycle taxi service, Tuktuk (motor-tricycle), 3: Personal car, 4: Motorcycle, 5: Bicycle, 6: Walking, 7: other, 99: N/A)
TIMETRAN	Time from residence to retail area (minute, 99: N/A)
DISTANHO	Distance from residence to retail area (kilometre, 99: N/A)
TYPEOFHO	Type of residence (1: House in gated community/ housing project (own), 2: Stand-alone house or shophouse (own), 3: Rental house/apartment/dormitory, 4: Unit in governmental housing, 5: other, 99: N/A)
GENDER	Gender (1: Male, 0: Female, 99: N/A)
AGE	Age (year)
OCCU	Occupation (1; Employed full-time (more than 40 hours a week), 2: Employed part-time (less than 40 hours a week), 3: Self-employed/freelance, 4: Unemployed/seeking work, 5: Retired, 6: Looking after family/home, 7: Full-time student at college/university, 8: other, 99: N/A)
EDU	Education (1: Lower primary school, 2: Primary school, 3: Secondary school, 4: Higher education, 99: N/A)
NUMFAMI	Number of members in the family (person)
AVEINCOM	Average income (Baht a month) (1: Lower 5,000, 2: 5,001 - 7,500, 3: 7,501 - 10,000, 4: 10,001 - 12,500, 5: 12,501 - 15,000, 6: 15,001 - 20,000, 7: 20,001 - 50,000, 8: Upper 50,001, 99: N/A)

Table E.2 Nakhon Nayok

AREA	REGBUYER	FREQBUYW	RETAIL	PRODUCT	SPENDW	REASON	TIMEBUY	MODEOFTR	TIMETRAN(MINUTE:	DISTANHO (KILOMETER:	TYPEOFHO	GENDER	AGE	OCCU	EDU	NUMFAMI	AVEINCOM
1	1	7	1	1	50	8	150	2	3	0.5	3	0	57.5	6	1	5	6
1	1	1	1	2	100	9	30	4	2	0.5	2	0	21	7	2	4	6
1	1	3	1	1	350	8	60	4	10	5	3	0	57.5	2	1	5	6
1	1	2	1	3	400	1,9	60	4	5	1	4	0	39.5	1	4	2	5
1	1	0.25	1	5	1500	12	60	4	5	4.5	2	0	21	7	4	5	6
1	1	0.25	1	11	1000	2,8	120	3	45	30	2	1	57.5	2	1	6	6
1	1	0.25	0	7	2500	1	60	3	30	20	2	1	39.5	2	4	6	6
1	1	7	1	3	75	8,9	17.5	6	1	0.2	2	0	49.5	6	3	4	6
1	1	2	0	3	2000	1	60	3	5	3	2	1	49.5	2	4	5	7
1	2	0.25	1	11	1000	8	60	3	5	5	2	1	57.5	8	2	5	5
1	2	0.25	1	8	75	12	5	4	2	0.5	3	1	49.5	3	3	2	5
1	2	2	1	2	40	2	22.5	4	2	0.5	3	0	29.5	6	3	3	5
1	1	1	1	3	200	1	60	4	10	8	2	0	39.5	6	4	4	6
1	1	2	1	2	20	2	12.5	6	1	0.3	2	0	21	7	2	7	7
1	1	0.25	1	8	150	8	5	4	3	5	2	1	21	7	3	4	5
1	1	3	1	3	150	9	30	6	5	0.5	2	0	49.5	6	3	6	6
1	1	3	0	1	2000	8	60	3	5	10	2	1	49.5	2	4	7	7
1	1	4	1	1,4,10,12	500	8,9	20	4	10	2	2	0	39.5	6	2	4	6
1	1	2	1	1	300	8,9	120	3	20	15	2	1	49.6	2	4	4	7
1	1	3	1	3	300	1	60	5	5	1.5	2	0	39.5	6	3	3	5
1	1	2	1	1	200	9	20	4	2	1	2	0	29.5	6	3	4	5
1	1	2	1	1	100	1	30	4	3	3	2	1	49.5	3	3	6	5
1	2	1	1	1	75	9	15	4	5	9	3	0	29.5	6	3	3	3
1	2	1	1	3	150	9	15	4	3	1	2	0	29.5	6	3	4	4
1	1	7	1	1	450	1,9	15	4,6	10	10	2	0	57.5	2	1	3	2
1	1	4	1	1,4	200	1,9	10	4,6	10	2	2	0	39.5	2	3	5	5
1	1	1	1	1,3	350	2,8,9,10	20	3,4	22.5	20	2	0	39.5	3	2	3	5
1	2	2	1	1	500	1,5,9	30	2,3,4	10	5	1	0	39.5	2	2	2	5
1	2	2	1	1,3	450	1,8,9	12.5	3,4	7.5	6	2	0	57.5	2	3	2	6
2	1	2	1	1,6	500	1,9	15	3	12.5	15	2	1	39.5	2	4	4	7
2	1	4	1	1	150	1,8,9	20	4	15	4	2	1	49.5	2	3	5	7
2	1	2	1	12	1250	9	10	4	20	5	2	1	29.5	3	4	4	1
2	1	3	1	12	500	9	12.5	4,5	7.5	0.8	1	0	29.5	7	3	4	1
2	1	1	1	12,13	700	9	7.5	4	4	0.2	2	1	39.5	2	3	4	7
2	1	2	1	1,3,9	600	1,2,8,9	17.5	4,6	10	3	2	1	39.5	1	4	3	6
2	0[26]	4	1	1	750	1,2,9,10	60	3	90	70	2	0	49.5	2	3	4	7
1	1	7	1	1	200	9	15	6	5	0.3	2	0	49.5	6	2	3	5
1	1	2	1	8,12	450	1,8,9	20	3	15	10	2	1	21	7	4	3	1

[26] other

1	1	2	0	1,3,4,6	2000	9,10	20	4	15	2	2	0	49.5	3	3	4	4
1	1	4	0	3	800	1,8,9	30	2	20	9	2	0	49.5	2	2	4	6
1	1	5	1	1	200	8,9	15	6	5	0.2	2	0	39.5	2	4	6	7
1	1	5	0	1,3,8,12	1000	8,9,10	30	3	15	8	2	0	49.5	2	3	4	7
1	1	3	0	1,4,8,12,14	1750	1,8,9,10	40	3	10	5	2	0	39.5	2	4	4	8
2	1	7	0	1,2,3	2000	1,9,10	30	4	10	1	2	0	49.5	2	1	3	6
2	1	5	1	1,3,4,5,8	800	1,8,9	20	5	20	1	2	0	49.5	6	1	2	4
2	1	2	1	12	1500	9	10	3	10	8	2	1	39.5	2	3	4	7
2	1	4	0	1	3000	1,8,9	45	2,4	15	2	2	0	49.5	2	1	4	6
2	1	2	1	1,12	150	8,9	12.5	4,6	10	0.1	2	1	39.5	3	3	3	5
2	1	7	1	1,3	450	9	5	4	2.5	1	2	1	49.5	2	4	3	6
2	1	7	1	1	500	8	10	4	10	0.5	2	0	39.5	3	1	3	7
2	1	7	1	1	1	9	10	4	10	0.5	3	1	39.5	3	2	1	3
2	1	7	0	1,4	2200	1,9	90	7	15	1	3	1	39.5	2	2	4	2
2	1	7	1	1	500	9	60	6	30	0.5	2	0	39.5	2	1	3	1
2	1	1	1	1	450	1	30	3	25	7	2	0	39.5	1	4	3	7
2	1	7	1	1,4	200	9	30	4	10	3	2	0	49.5	3	1	5	6
2	1	2	1	3,4	150	1,9	45	4	7.5	1	2	0	49.5	1	4	2	6
2	1	7	1	1	150	9	30	4	7.5	1	3	1	57.5	3	1	5	6
2	1	2	1	1	100	9	60	4	20	1	2	1	49.5	3	2	1	2
2	1	7	0	1	5000	1,9	60	4	5	0.2	3	1	49.5	2	1	4	7
2	1	7	1	1	200	9	30	4	20	1	3	0	49.5	3	1	4	2
2	1	7	1	1	250	1,9	60	4	20	0.5	2	0	29.5	3	1	4	2
2	1	7	1	1	200	9	10	4	5	0.1	2	1	39.5	3	1	3	6
2	1	3	1	1	250	1,11	30	4	22.5	10	2	0	49.5	1	4	6	7
2	1	7	1	3	200	9	30	7	10	1	3	1	39.5	2	2	4	6
2	1	7	1	1	250	9	60	4	20	0.5	2	0	39.5	2	2	3	7
2	1	6	0	1	750	9	60	4,6	10	0.3	2	0	49.5	2	1	8	6
2	1	2	1	1,3	200	9	10	3	5	1	3	1	39.5	2	3	4	6
2	1	2.5	1	1	150	1,12	30	4	10	3	2	1	49.5	2	3	7	4
2	1	7	1	1,5	200	12	60	4	30	5	2	0	39.4	2	1	3	2
2	1	5	0	1	650	8,9	10	4	5	0.5	2	1	49.5	2	1	3	3
2	1	7	0	1	2250	8,9	60	3	10	1	3	0	39.5	2	1	4	3
2	1	7	1	1	600	8,9	60	4	30	3	3	0	29.5	2	1	3	5
2	0	1	1	1,3	200	9	30	3	10	5	2	0	39.5	1	4	3	7
2	1	7	1	3	200	9	30	4	5	3	3	0	39.5	3	2	3	5
2	1	0.5	0	3	2000	9	30	4	20	10	2	0	21	3	2	5	7
2	3	0.5	1	1	500	1	20	3	10	4	3	0	29.5	1	3	8	5
2	1	2.5	1	1	150	0	30	3	30	16	1	1	39.5	1	4	6	8
2	1	7	1	1	50	1,11	20	4	15	2	2	0	57.5	5	4	1	1
2	1	7	1	1,7	150	1	60	3	30	13.5	2	1	49.5	2	1	4	6
2	1	2	0	1,3	1000	1	60	3	30	10	2	0	29.5	3	2	10	8
2	1	3	0	1	1000	9	30	4	10	3	2	0	29.5	3	4	2	7
2	1	0.5	0	1,3	5000	1	30	3	22.5	17	2	1	39.5	3	3	3	2
2	1	0.5	1	1	150	11	20	3	15	8.5	4	0	49.5	1	4	4	5
2	1	1.5	1	1,3	100	9	20	3	15	10	3	1	39.5	2	3	4	8
2	1	3	1	1	500	9	30	3	15	13	3	0	39.5	1	4	3	6
2	1	2	1	1	200	8,9	30	3	20	5	4	0	49.5	3	2	5	4
2	1	1	1	1	300	12	105	1	30	10	2	0	57.5	6	4	1	4
2	1	7	1	1,2,7	420	9	30	3	10	3	2	0	57.5	1	4	3	7
2	0	1	1	1	500	1	60	4	15	3.5	2	0	49.5	3	1	6	1
2	1	7	1	1	200	8,9	30	3	5	3.5	2	1	57.5	5	3	1	7
2	0	0.25	1	13	750	12	90	4	15	3.5	2	0	29.5	2	4	1	3

2	1	1	1	3	500	9	60	4	15	5	2	0	21	3	2	1	2
2	1	5	1	3	150	9,11	30	3	20	12	2	1	49.5	1	4	4	8
2	1	4	1	1	250	9,11	60	6	10	0.5	2	0	57.5	2	3	1	3
2	1	2.5	1	7	400	9,11	60	3	30	17	2	0	29.5	1	4	5	3
2	1	1.5	0	1	1000	9	60	4	10	2	2	0	57.5	5	4	1	3
3	1	5	1	1	300	8,9	30	2	10	3	2	0	57.5	6	3	4	6
3	1	2	1	9	100	9	20	4	5	2	2	1	29.5	1	4	3	7
3	1	2	1	2	1000	9,10	60	3	15	6	2	1	49.5	2	4	4	7
3	1	2	1	3	100	9	22.5	6	2	0.5	2	0	29.5	7	3	4	5
3	1	3	1	1	100	9	30	4	5	3	2	0	29.5	1	4	3	6
3	1	1	1	1	100	8,9	60	4	10	5	3	0	39.5	1	4	5	6
3	1	6	1	2	100	9	60	6	5	0.5	3	0	39.5	3	3	2	5
3	1	2	1	9	100	10	45	4	10	5	2	1	21	7	3	5	7
3	1	2	1	2	250	9	45	3	10	4	2	1	29.5	2	4	3	6
3	1	5	1	1,9	100	9	30	1	15	2	2	1	21	7	2	4	6
3	1	1	1	3	200	8,9	60	4	5	2	4	1	39.5	1	4	3	6
3	1	6	1	1	500	8,9	40	6	5	0.5	2	1	49.5	2	3	4	7
3	1	5	1	1	300	8,9	30	6	5	0.5	2	0	49.5	6	2	3	7
3	1	5	1	2	100	8,9	30	1	20	6	3	1	39.5	1	4	3	6
3	1	7	1	2	50	8,9	30	3	5	1.5	2	1	49.5	3	1	2	6
3	1	2	1	5	150	8,9	60	3	15	8	2	0	49.5	6	2	4	7
3	1	1	1	5	1000	8,9	90	3	15	6	2	0	39.5	2	4	3	7
3	1	5	1	1	400	9	45	4	5	2	2	1	57.5	5	3	3	7
3	1	1	1	5	1250	9,10	75	3	20	10	2	1	39.5	2	4	4	7
3	1	2	1	5	250	9	45	3	25	8	2	0	39.5	2	4	2	7
3	1	3	1	3	350	9	30	4	5	2	2	1	49.5	2	2	4	6
3	2	4	1	1	450	8,9	30	6	7.5	1	2	1	57.5	5	2	3	7
3	2	5	1	1	300	8,9	40	6	10	1	2	0	57.5	6	1	4	7
3	2	4	1	1	375	8,9	35	2	5	3.5	2	1	57.5	5	1	3	7
3	1	1	1	3	350	9,10	30	4	30	14	2	1	29.5	1	4	3	4
3	1	7	0	3,11	3500	3,9	22.5	3,4	10	9	2	1	57.5	2	3	4	6
3	1	2.5	1	3	360	3,9	30	3	20	12	2	0	39.5	3	1	2	2
3	1	1	1	3,11	750	1,9	60	4	30	16	2	0	57.5	2	1	4	2
3	0	0.25	1	4,5	500	1,10	30	3	15	2	2	1	39.5	1	4	4	6
3	1	1	1	3	550	9	30	3	45	7	2	1	49.5	3	1	4	4
3	1	0.5	0	3,7	1500	9	30	3	10	7	2	1	29.5	1	4	4	4
3	1	2	0	2,3	3000	1,9	60	3	30	4	2	1	49.5	1	2	9	7
3	1	1	1	3	500	9	30	3	20	15	2	1	39.5	1	4	7	7
3	1	1	1	1,3	200	9,11	20	4	15	3	2	0	49.5	6	1	4	1
3	1	0.5	1	3,7	750	1,9	30	3,4	20	5	2	0	29.5	9	4	5	6
3	0	0.25	1	3	700	1,12	20	3	15	4	4	1	49.5	5	3	2	7
3	3	1.5	1	4	500	10	17.5	3	7.5	1	2	0	29.5	9	4	5	7
3	0	3	1	3	350	9	10	4	20	13	2	0	39.5	1	4	3	2
3	0	1	1	2,3	100	11	30	7	20	10	3	0	29.5	1	2	5	7

Table E.3 Ang Thong

AREA	REGBUYER	FREQBUYW	RETAIL	PRODUCT	SPENDW	REASON	TIMEBUY	MODEOFTR	TIMETAKAN (MINUTE:	DISTANHO (KILOMETER:	TYPEOFHO	GENDER	AGE	OCCU	EDU	NUMFAMI	AVEINCOM
1	1	5	1	4	200	3,8,10	20	3	10	4	2	0	24	7	5	2	1
1	1	1	1	10,11	3000	2,9,10	30	3	40	30	2	1	54	8	3	2	7
1	1	7	1	2,3	200	2,3,9,11	15	4	5	0.1	2	1	43	3	4	4	5
1	1	7	1	1	150	4,7,9,10	10	6	15	0.1	2	1	64	5	4	2	2
1	1	7	1	2	150	11	20	6	2.5	0	3	0	53	2	1	3	5
1	1	7	1	2,3	37.5	3,8,11	5	6	5	0	2	1	16	7	2	4	1
1	1	3	1	11	150	2,4,8,10	7.5	4	10	2	2	1	37	3	4	4	4
1	0	7	1	1,3	250	4,7,9,11	10	5,6	10	0.5	2	0	52	6	1	2	2
1	2	7	0	3	1750	1,3,7,8,11	20	4	20	2	2	0	40	2	3	4	5
1	2	7	0	3	2000	1,4,9	13	4	5	2	2	0	38	2	3	5	4
1	2	2	0	1	3500	1,9,10	30	3	28	15	2	0	45	2	1	4	7
1	2	4	1	1	500	1,5,7,8,10	30	4	15	1.5	2	0	48	3	3	4	5
1	1	7	1	2	70	3,8,9	15	4	10	2	2	0	45	2	3	4	5
1	1	1	1	10,11	3000	2,4,8,9,10	10	3	30	17	2	1	58	2	4	4	7
1	1	2	1	2,3,4, 9	500	1,3,4,7,8,9,1 0	10	4	20	7	2	0	52	2	3	4	6
1	1	7	1	2,3	100	4,7,8,9,10,11	20	4,6	5	0.2	2	1	35	1	5	3	6
1	1	3	1	1,2,3	500	3,4,7,8,9	10	4	10	3	2	0	44	3	2	3	5
1	1	0.3	1	11	4000	3,6,8	20	3	20	12	2	1	38	8	4	4	7
1	1	7	1	3	250	8,9,11	30	5,6	15	2	2	0	71	2	3	1	2
1	1	2.5	1	2,9	650	3,4,9	15	4,5	25	2	2	0	58	2	2	2	6
1	2	5	1	3	150	8,9,11	60	3	20	11	2	1	52	1	5	4	8
1	0	0.5	1	2,3	200	4,9,11	20	3	15	10	2	1	56	1	5	4	7
1	2	7	1	1,2,3	300	1,3,7,9,10	20	3	10	4	2	0	44	2	4	4	7
1	2	7	0	1	1000	1,2,7,9,10	20	3	13	8	2	0	57	2	1	4	7
2	1	7	1	1	850	1,11	20	4	5	0.1	3	1	40	3	2	2	2
2	1	1	7	1	1	3	10	4	20	1	2	1	53	3	2	3	2
2	1	3	1	3	200	11	30	3	15	1	2	0	45	2	3	3	2
2	1	7	0	1,3	1000	3	30	4	10	1	2	0	38	2	2	5	5
2	1	7	1	1,2,3	450	11	30	6	3	0	2	0	52	2	3	5	8
2	1	7	1	1	400	1	15	3,4	10	1	2	1	41	1	6	2	7
2	1	7	1	1,2,3	300	8,11	30	6	1	0.1	2	0	58	2	6	3	8
2	1	4	1	1	300	11	10	4	10	4	2	1	55	1	6	4	7
2	1	2	1	3	1000	3	60	3	20	8	2	0	50	1	6	4	7
2	1	1	1	1	1000	1	12 0	1	10	9	2	0	56	6	1	6	6
2	1	3	1	1,3	300	1	10	3	4.5	5	2	0	59	1	6	2	7
2	1	3	1	1	35	11	20	6	10	0.1	3	1	59	3	4	5	2
2	1	1	1	3	200	11	5	4	5	3	2	0	40	2	2	5	3
2	1	3	0	3	600	3	10	6	2	0	2	0	28	2	5	6	5
2	1	1	1	3	50	11	30	4	5	3	2	1	42	3	2	2	1

2	1	1	1	1	300	11	60	3,4	20	5	2	1	50	1	5	4	7
2	1	7	1	1	200	11	30	4	20	9	2	0	36	3	1	5	2
2	1	1	1	1	1500	2	30	3	15	3	2	0	40	3	1	3	3
2	1	7	1	1	200	11	20	4	10	1	3	0	53	2	3	3	5
2	1	7	1	14	300	11	240	4	15	4	2	1	48	2	4	3	5
2	1	1	1	1	500	11	30	2	30	20	3	0	45	1	5	3	6
2	1	3	1	1	500	8	30	3,4	30	11	2	1	39	3	3	5	3
2	1	7	1	1	200	11	20	4	20	4	2	1	58	2	5	4	3
2	1	4	1	1	200	11	30	6	5	0.1	2	1	55	2	5	3	5
2	1	2.5	1	1,3	450	11,12	45	4	10	2.5	1	1	33	1	3	4	3
2	1	7	1	1,3	350	1,2,8	75	4	10	0.7	2	1	38	5	3	6	7
2	1	7	1	1,3,8	350	2,12	20	3	10	4.5	3	0	40	6	5	5	7
2	1	2	1	1,3	500	11	45	3,4	15	2.5	2	0	48	1	3	3	6
2	0	0.5	1	1,3,9	450	3	30	3	10	10	2	1	42	1	6	6	7
2	0	1.5	1	1	150	1	13	4	18	10	2	1	38	9	1	6	3
3	1	2	1	2,5	250	2,10	30	3	5	2	1	0	30	1	5	2	4
3	1	1	1	3	1000	1	60	3	20	17	2	0	53	8	1	5	99[27]
3	1	0.5	1	2	300	2	30	3	15	10	2	1	28	3	4	5	2
3	0	0.3	1	15	2000	12	60	3	10	5	5	1	32	1	3	3	4
3	0	0.5	1	3	2000	1	60	3	10	9	2	1	33	1	3	7	4
3	0	99	1	5	140	12	10	4	7.5	2	2	0	47	3	1	5	99
2	1	1	1	1,8	550	11	60	4	10	3	2	0	20	7	3	3	3
2	0	0.5	1	1,9	1000	11,12	120	1	25	25	2	0	23	1	5	5	4
2	1	99	1	12	200	8	1	3	10	10	2	1	53	3	3	2	4
2	1	3.5	1	1,11	80	3	60	4	5	1	3	0	45	2	1	2	3
2	1	2.5	1	3,12	500	9	120	4	15	16	2	1	30	1	5	5	2
2	1	0.5	1	1,2,3,4	350	1,3	30	3	20	15	2	0	44	1	5	4	7
3	1	7	1	2,5	1000	11	30	4	10	10	2	1	20	3	3	3	6
3	1	5	99	13	40	11	30	1	20	10	2	0	19	7	4	5	1
3	0	0.5	1	5,15	350	1,12	60	1	30	20	3	0	50	6	1	4	1
3	0	0.5	1	2	350	2	30	4	15	18	2	0	33	1	6	6	4
3	0	99	1	1,2,3	250	1	45	3	15	99	2	0	19	7	5	2	2
3	1	4	1	3	100	11	30	6	5	0.5	2	0	65	5	4	3	2
3	1	3.5	1	2,3	500	9,11	30	4	5	2	2	0	35	2	3	4	4
3	1	1.5	1	5	750	8	60	3	15	6	2	0	48	3	5	5	7
3	1	4.5	1	3	350	11	45	4	5	2	2	0	60	6	1	3	2
3	1	6	1	2,3	150	9,11	60	3	5	2.5	2	1	42	1	5	6	6
3	1	5	1	1	75	11	53	2	20	15	2	0	31	1	5	4	5
3	1	7	1	2	75	11	35	4	10	8	2	1	48	3	4	3	3
3	1	5	1	2	45	11	30	1	15	5	2	1	17	7	2	4	1
3	1	5	1	2	50	9,11	45	1	20	10	2	0	32	1	5	3	5
3	2	4	1	1	500	8	40	6	10	1	2	0	59	6	4	4	2

[27] N/A

3	2	6	1	1	500	11	38	4	5	3	2	0	49	6	5	4	4
3	2	6	0	1	1500	1,9	45	3	10	6	2	0	52	2	4	4	5
3	1	1.5	1	5	1000	2	60	3	15	8	2	0	45	2	5	4	7
3	1	4	1	2	100	6,11	45	3	25	15	2	0	45	1	5	6	6
3	1	4	1	2	75	11	53	2	28	15	2	1	34	1	5	4	4
3	1	5	2	1,3	500	11	45	6	5	1	2	0	49	2	4	5	4
3	1	1.5	1	5	1000	2,9	75	2	20	10	2	1	56	3	4	5	3
3	1	2.5	1	1,3	750	8,9	50	4	10	5	2	0	42	2	4	5	4
3	1	5	1	2	100	11	45	3	30	15	2	1	39	1	6	4	7
3	1	2	1	5	600	2,8,9	75	3	20	12	2	0	51	6	4	5	6
3	2	4.5	1	1	500	8,11	30	4	10	6	2	0	47	3	4	6	4
3	2	2	1	1	650	11	45	4	5	3	2	0	38	1	5	3	5
3	2	2	1	1,3	750	3,11	30	4	5	2	3	1	47	3	5	2	3
3	2	2.5	1	1	550	9,11	30	4	5	3	2	1	42	1	6	4	5
3	1	7	1	1	200	11	30	4	15	2	1	0	28	2	4	2	8
3	1	7	0	1,3	3500	1,11	60	4	5	3	2	0	20	3	1	3	2
3	1	2	1	1	200	8,11	30	3	25	15	5	1	44	9	5	5	99
3	1	1.5	1	1	900	1,11	120	4	15	6	2	0	39	1	5	7	7
3	1	7	1	1,3	500	1,8	60	3	15	3	2	0	33	6	3	4	2
3	1	5	1	1	300	11	20	4	15	12	2	0	37	1	6	5	4
3	1	7	1	1	400	11	5	7	10	6	2	0	45	3	5	3	6
3	1	7	1	1,3	250	12	30	2	10	2.5	2	0	51	1	3	4	6
3	0	0.5	1	1	500	1	150	1	40	28	2	1	20	7	5	3	3
3	2	5	1	1	100	11	30	1	30	12	2	0	52	3	1	3	1
3	0	0.5	1	5	2000	9	25	1	60	35	2	0	28	2	2	8	4
3	0	1.5	1	1	750	11	60	3	30	10	2	0	35	1	5	5	6
3	1	3	1	1	250	5,9	20	4	5	3	2	0	28	1	6	4	3
3	1	1	1	7	1200	11	35	4	10	3	2	1	34	3	3	12	5
3	1	7	0	1,3	2500	1,8	30	3	30	10	1	0	45	2	3	4	2
3	1	2.5	1	1,3	1000	11	60	3	30	15	2	0	45	3	99	3	3
3	1	7	0	1	750	2,8	10	4	5	1	3	0	39	2	1	5	4
3	1	7	1	1,3	750	8,11	30	4	5	1.5	2	0	25	1	5	7	5
3	1	5	1	1	100	11	7.5	4	5	2	4	0	28	1	2	3	3
3	1	2	0	1	1500	1,11	45	3	20	10	2	0	50	2	1	2	2
3	2	4	1	1	500	12	90	3	15	12	3	0	40	3	5	2	4
3	2	2.5	1	1,3	500	1	45	4	18	10	2	1	39	3	1	5	3
3	2	2	1	1	100	11	10	4	5	1.5	2	0	26	1	4	8	3
3	0	0.3	1	5	>2000	12	180	3	30	30	2	0	29	2	5	5	6
3	1	1	1	1,3	300	1,9	30	4	5	4	1	0	42	6	4	5	3
3	1	4	0	1	2500	1,7	60	3	30	20	2	0	42	2	5	4	7
3	1	3	1	1	500	1,7	60	4	15	5	1	1	45	3	5	4	6
3	1	7	0	1	1000	4,9,11	20	4	2	0.5	2	0	52	2	4	5	7
3	1	7	0	1	2000	1,3,7	45	3	15	5	2	1	56	2	2	4	7
3	1	7	0	1	1000	1,8	30	2	5	3	1	0	52	2	2	6	6

3	1	2	1	1	500	1,11	38	3	20	10	2	0	41	1	5	4	6
3	1	3	1	1	300	1,2,3,11	60	4	20	8	3	0	38	6	3	5	3
3	1	5	0	1	2500	1,9,10	60	3	60	30	2	1	51	2	5	4	6
3	1	2	1	1	300	1,2,3,11	30	3	20	15	1	1	53	1	5	4	5
3	1	1	1	1	500	1,7,9	30	4	2	0.5	3	0	32	3	3	4	3
3	1	3	0	1	2000	1,3	30	3	20	15	2	0	38	2	5	3	6
3	1	5	1	1	150	1,9,11	30	4	10	5	3	1	38	3	3	3	4
3	1	7	0	1	1500	1,7,9,10,11	30	4	3	0.5	2	1	28	2	5	5	5
3	1	4	0	1	3000	1,10	60	3	45	30	2	1	49	2	5	3	7
3	1	2	1	1	300	1,2	40	4	2	1.5	3	0	30	3	5	3	3
3	1	2	1	1	200	1,11	30	4	10	3	2	1	34	1	5	3	4
3	1	3	1	1	300	1,2,3	30	2	10	5	2	0	40	6	5	5	4
3	1	7	1	1	175	1,2,11	60	4	10	15	3	0	43	6	3	4	4
3	1	5	0	1	1000	1,2,11	45	4	3	0.5	2	0	46	2	3	5	6
3	1	3	0	1	1500	1,4	60	2	10	5	2	0	56	2	3	4	5
3	1	4	0	1	3000	1,2	60	3	20	20	2	0	43	2	5	3	6
3	1	3	1	1	500	1,7,10	30	4	15	10	2	0	42	1	5	4	5
3	1	3	1	1	300	1,9	45	4	3	1	2	0	38	3	5	4	5

Table E.4 Chachoengsao

AREA	REGBUYER	FREQBUYW	RETAIL	PRODUCT	SPENDW	REASON	TIMEBUY	MODEOFTR	TIMETRAN(MINUTE:	DISTANHO (KILOMETER:	TYPEOFHO	GENDER	AGE	OCCU	EDU	NUMFAMI	AVEINCOM
1	1	5	1	2	50	11	60	6	10	1	3	1	36	1	5	5	5
1	1	4	1	1	250	2,3,9	60	4	10	3	2	0	48	3	5	4	3
1	1	3	1	5	250	8,11	120	6	5	0.5	2	0	43	2	5	4	6
1	1	2	0	8	2000	2,11	30	3	40	20	2	1	52	2	5	5	6
1	1	7	0	1	1000	2,9,10	60	5	3	0.5	2	0	35	2	5	4	5
1	1	3	0	3	2000	8,9	60	3	15	5	2	1	40	2	5	4	6
1	1	5	1	2	100	8,11	120	6	10	0.5	2	1	58	5	5	5	3
1	1	5	1	2	100	1,3,8,9,11	60	6	10	1	2	1	67	5	5	4	3
1	1	5	1	1	150	4,7,9,11	45	1	30	10	2	0	56	6	3	5	3
1	1	3	1	1	2000	9,10	60	3	30	15	2	1	36	2	5	3	6
1	3	5	1	2	50	11	30	4	5	0.5	2	0	35	3	4	3	4
1	3	3	1	2	100	11	45	6	5	0.5	2	0	29	3	5	2	4
1	1	2	1	3	300	1,9,10	45	1	15	5	2	0	48	1	3	4	5
1	1	3	1	3	500	8,11	60	3	20	10	2	1	41	3	5	5	6
1	1	5	1	2,12	200	8,9,11	180	4	5	3	2	1	28	4	5	5	2
1	1	5	1	2	50	8,11	60	4	20	15	3	1	36	3	5	4	4
1	1	4	0	3	2000	1,4,8,10	60	3	45	30	2	0	52	2	5	4	6
1	1	7	1	12	70	9,11	180	4	10	5	2	1	18	7	3	6	1

1	1	1	1	8	300	1,8,9	120	4	5	3	3	1	24	3	5	5	3
1	1	4	0	1	2500	1,2,7,11	90	3	20	15	2	0	48	2	5	6	7
1	1	7	0	1	1000	1,2,8,11	60	4	5	2	2	0	40	2	5	3	6
1	1	4	0	1	2000	1,3,4,9,10	120	3	30	20	2	1	38	2	5	7	7
1	1	5	1	2,3	150	11	45	4	5	3	2	1	26	3	5	3	4
1	3	1	1	3	150	11	15	4	2	1	2	0	32	3	5	4	4
2	1	7	1	1	1750	1,7,9,11	20	6	5	9.5	3	0	26	2	5	3	8
2	1	5	1	1	5500	1,2,3	20	4	20	14	2	0	47	2	3	2	4
2	1	2	1	1,3	1000	2,3,4,11	20	4	15	10	2	0	29	6	4	3	3
2	1	1	0	11	35000	4,8,10	10	3	20	12.5	2	0	47	2	4	6	6
2	1	2.5	1	1,3	250	3,11	60	3	20	15	2	0	28	1	4	5	4
2	1	2	0	3	500	3,4,7,9,11	60	3	15	16	2	1	23	2	5	6	7
2	1	2	1	1,3,4	1000	1,3,4,7,8	10	3	10	3	2	0	35	1	6	4	8
2	3	5	1	1,3,6	35000	1,2,3,4,6,7,8,11	60	3	15	10	2	0	39	2	6	8	8
2	1	7	0	3,8,11	15000	2,3,4,9,10	30	3	15	12	2	0	63	2	1	9	5
2	1	7	0	1,3	7000	1,2,3,8,9	45	2	20	15	2	1	43	2	5	2	7
2	0	1	0	11	1900	3,4,8,9	20	3	20	15.5	2	1	23	3	4	3	3
2	0	1		3,8	1000	1,3,7	10	1,2	20	8	1	0	27	1	5	6	5
2	0	2	0	11,13	450	1,8,10	20	3	120	80	2	0	59	6	1	7	4
2	1	2	1	3,4	10000	2,3,4,9	120	3	40	16	2	1	60	8	1	6	6
2	3	2	1	1,3,5,15	1000	1,3,4,7	180	1	40	30	2	0	22	1	4	5	8
2	1	5	1	1,3	500	9,11	30	3	17	20	2	0	50	8	5	7	2
2	1	2	0	3,4	8000	1,3,4,8	30	2	25	10	2	0	25	7	5	4	4
2	1	2.5	1	1,3	300	3	60	4	30	18	2	0	37	1	5	10	3
2	3	3	0	3,15	5000	1,2,3,5,9,10	20	3	15	13	2	1	55	2	5	4	6
2	1	3	1	1,2,3,8	1000	2,4,5,6,7,8	10	3	30	35	2	1	62	5	2	3	7
2	1	1	1	1,3,4,5	200	2,3,7,9,11	30	3	40	32	2	1	40	1	4	4	7
2	0	4	1	1,2,3	7500	1,2,3,4,11	40	3	15	10	2	1	35	7	5	4	6
2	0	0.25	1	1,5	500	2,11	60	3	30	29	2	0	27	1	6	4	4
2	0	0.25	1	1,3,4,6	2500	2,3,7,11	60	3	120	70	3	0	50	1	5	6	7
2	0	2	1	1,4,7	1000	2,3,4,7	10	3	5	2	2	0	52	1	6	4	7
2	1	0.25	1	4	500	4,9	60	1	20	10	2	0	49	3	1	6	1
2	1	1	1	1,7	500	1,3	90	4	30	10	3	0	35	1	4	3	5
2	1	2.5	1	3	500	1,4,7	60	3	30	12	2	0	35	1	5	3	4
2	1	4	0	1	2500	1	60	4	30	10	2	1	50	2	99	2	2
2	1	2	1	1	1000	1,2,11	120	3	20	12	2	0	45	2	5	6	7
2	1	0.25	1	1,3	4500	1,3	60	3	15	30	2	0	43	3	3	4	6
2	1	2.5	1	2,3	200	3,11	60	3	20	10	2	1	26	3	2	5	2
2	1	1.5	0	10	45000	3,4,8	20	3	20	8	2	0	29	2	5	2	3
2	1	4	1	1	300	7,11	30	4	15	5	3	0	35	3	3	4	2

2	1	3	1	3,4	700	7,11	90	6	5	0.5	3	0	36	3	3	2	2
2	1	4	0	11,14	1000	4,8	60	1	30	10	2	1	50	2	3	1	1
2	1	4	1	1,4,5	350	1,4,11	90	2	60	30	2	0	20	7	4	6	2
2	1	7	0	1	100	11	30	1	30	10	2	0	30	1	4	99	3
2	1	7	0	1	6000	3,4,8	99	3	60	22	2	0	47	2	1	5	1
2	1	1	0	1,3	1000	3,4,7	120	1	1	20	3	0	53	3	1	2	2
2	1	7	1	1	280	1,3,4,7,8	90	3	15	7	2	0	21	9	5	7	2
2	1	7	1	1	200	11	30	4	5	2	2	0	28	1	5	3	3
2	1	7	0	1	1250	7,11	75	3	20	10	2	0	40	2	2	3	3
2	1	7	0	1	650	4,8	75	1	30	15	2	0	58	2	2	4	2
2	1	2	1	1	550	1,4	60	2	20	10	2	0	50	6	1	3	2
2	1	3	1	1,2,4,8	2000	1,2,4,7,10	180	3	15	20	1	0	21	7	5	6	1
2	1	2.5	1	4,12	600	4,7,11	150	3	30	15	2	0	28	1	5	99	3
2	1	2	1	15	300	9,11	22.5	4	15	7	2	1	26	7	5	3	3
2	1	0.25	1	4	2500	3,4,7	150	1	30	14	2	0	39	2	1	4	5
2	1	0.75	1	4	250	11	120	1	30	20	2	0	21	7	4	4	1
2	1	5	1	2	200	11	10	6	2	0.1	2	0	50	2	2	4	1
2	1	1.5	1	4	550	1,11	150	3	15	10	2	0	54	8	1	4	4
2	1	1	1	4,5	2500	8	120	3	20	12.5	2	0	35	1	5	4	6
2	1	1	1	3	750	3,12	15	6	3	0.3	3	0	61	2	1	5	7
2	1	1	0	1,11	500	8,12	5	3	30	99	2	0	44	3	3	6	2
2	1	5	1	1,3	150	1,5,7,11	30	6	5	0.5	1	0	44	2	5	4	4
2	1	7	0	1	750	3,8,11	30	6	10	1	2	0	46	2	2	3	3
2	1	3	0	3,11	3500	1,11	60	3	60	70	4	1	41	1	4	3	3
2	1	3	0	1	1350	1,8	60	2	30	99	1	0	40	2	2	7	2
2	2	2.5	1	1	150	11,12	20	4	10	3	2	0	47	1	4	4	6
2	3	1	1	3	250	1,3	20	4	10	1	2	0	53	2	3	9	1
2	3	1	1	3	250	3	20	4	5	1	2	0	33	2	5	6	4
2	1	2.5	1	3,4	750	1,3	60	4	30	10	2	0	28	6	3	5	1
2	1	5	1	1	100	11	30	4	15	2.5	2	0	53	2	1	2	2
2	1	0.25	1	1,3	450	12	180	1	60	18	1	0	65	2	1	2	1
2	1	1	1	1,3	500	8,11	5	6	2.5	0.1	3	1	43	2	5	4	6
2	1	7	0	1,3	350	8,11	5	6	5	1	1	1	54	2	4	3	4
2	1	7	1	1	200	11	20	4	20	12	2	0	50	8	2	7	3
2	3	0.25	1	5	1000	8	150	3	12.5	20	2	0	33	2	5	9	2
2	1	7	1	3	200	11	20	4	30	6	2	0	35	6	1	4	1
2	1	3	1	1	100	11	60	4	30	6	3	1	38	3	2	4	3
2	1	2	1	5	250	3	10	1	5	3	1	0	38	9	3	3	4
2	1	7	1	3	100	9	10	4	10	3	1	1	40	1	3	3	2
2	1	2.5	1	3	250	11	20	4	15	17.5	5	0	60	5	5	5	4
2	1	7	1	3	200	11	22.5	4	10	3	2	0	46	6	4	5	3
2	0	2	1	2	150	11	7.5	4	20	20	2	0	21	7	5	3	1
2	0	1.5	1	1,3	300	11	30	4,7	30	31	2	0	43	1	4	4	5

2	0	2.5	1	12	99	11	99	4	10	2	3	0	41	6	2	5	3
2	3	1.5	1	1,3	300	11	150	3	20	15	2	0	30	2	5	4	6
2	3	1	1	12	1500	8	99	1	20	10	2	0	46	2	4	9	7
2	0	1.5	1	4	1000	2	15	1	30	99	2	0	40	3	1	5	4
2	1	5	1	2,5,9	250	11	60	6	30	10	2	0	20	7	5	5	5
2	1	4	1	1,3,4	400	11	60	4	15	5	2	1	40	1	5	5	7
2	1	7	1	1	100	8,11	30	4	5	2.5	3	1	50	3	3	3	6
2	1	3	1	1	200	6,9	20	4	5	2	2	1	47	2	3	3	4
2	3	0.75	1	5,9	500	11	20	4	15	13.5	2	1	31	1	3	2	5
2	0	5	1	4	1000	1	30	4	10	1	2	1	37	1	3	3	6
2	3	0.25	1	5	500	1	480	1	60	35	2	0	23	1	4	4	2
2	0	1	1	1	500	9	20	4	30	5.5	2	0	34	2	5	6	7
2	0	1	1	1	1000	7,8	30	3	10	5	2	0	47	2	5	3	4
2	3	1	1	4	1000	1	120	4	10	5.5	2	0	30	6	1	7	3
2	0	1	1	4,11,14	1000	1,3		60	3	12.5	3	0	30	1	4	5	4
2	0	7	1	1	200	11	45	6	15	3	2	1	45	8	1	5	2
3	1	4	1	2,3,5,9	1000	1,2,3,6,7,9	50	2	20	8	2	0	31	3	4	2	5
3	1	2	1	2,3,12	1500	1,3,5,6,7,9	90	3	10	4	2	1	40	1	5	4	8
3	1	7	0	2,3	950	3,5,6,7,9	20	3,4	5	0.9	2	0	52	2	4	5	7
3	1	1	1	2,3	1250	1,3,5,6,9	60	3	30	20	2	1	35	1	5	3	7
3	1	2	1	3	700	1,3,9,10	50	3	35	14	2	0	42	6	4	4	4
3	1	2	0	3	1500	1,3,5,6,7,9	60	3	30	15	2	0	38	2	4	4	7
3	1	7	1	2,3,12	300	1,6,7,9,10	60	4	20	7	3	0	58	3	3	4	5
3	1	7	1	2,3,13	200	1,7,11	20	2	12.5	5	2	1	33	1	5	2	6
3	1	3	1	2,8	150	1,4,8,9,10,11	120	3,4	20	12	2	0	37	2	2	3	7
3	1	2	1	2,15	125	9,10,11	120	3	10	5	2	1	56	2	4	4	7
3	1	3	1	2,12	2000	1,9,10	17.5	2	15	3	2	0	45	6	2	99	4
3	1	7	1	2,3,4,12	300	1,7,9,10,11	60	3	6	2	2	1	35	1	5	4	6
3	1	7	1	2	150	5,9,10	60	3	15	10	2	1	53	2	5	3	8
3	1	0.25	0	1,3	2000	1,3,7,9,10	60	3	15	9	2	0	44	2	2	3	6
3	1	0.5	1	3	800	1,3,6,7,9,10	30	3,4	20	8	3	0	28	3	4	2	3
3	1	0.5	1	3	1000	2,5,9,10	30	3	20	18	2	0	21	1	4	5	3
3	1	0.25	1	2,3	2000	1,3,5,7,9,10	30	3	13	12	2	1	27	1	4	2	6
3	1	0.5	0	3	3000	1,2,3,5,6,7,9,10	60	3	12	9	2	0	58	2	3	4	7
3	1	1	1	2	800	9,10	60	3	6	7	2	1	36	1	5	4	8
3	1	0.25	1	2	500	6,9,10,11	60	3	8	6	2	0	27	1	5	2	5
3	1	0.5	1	1,3	1000	1,3,6,7,9,10	30	3	10	8	2	1	38	1	5	4	7
3	1	2	1	13	80	9	12.5	2	7.5	2	3	0	34	1	4	2	5
3	1	7	1	2	100	8,9,10,11	30	4	10	3	2	1	45	1	4	4	6

3	0	99	99	15	99	9	30	3	120	160	2	1	43	2	5	2	7
3	1	0.5	1	3	1750	1,6,11	60	4	10	5	2	1	59	2	4	6	7
3	1	1	1	12	1000	8	60	3	15	8	2	1	56	2	4	5	6
3	1	1.5	1	3	1500	5,9	60	4	7.5	4	2	0	48	2	4	4	7
3	1	1.5	1	1,3	1500	1,11	75	3	10	5	2	1	51	2	4	5	6
3	1	4	1	2	50	11	37.5	1	20	7	2	0	42	1	5	99	6
3	1	5	1	2	60	11	45	3	10	5	3	1	35	1	5	4	6
3	1	1	1	3	700	1,5	52.5	4	10	3.5	3	0	53	6	3	3	4
3	1	1.5	1	1,3	900	1,2,9	75	4	10	3.5	2	0	41	6	4	4	4
3	1	0.25	1	12	1500	2,8	60	4	15	7	2	1	56	5	4	4	7
3	1	1	1	1,3	750	1,5,11	75	4	10	4	2	0	37	1	6	3	7
3	1	0.5	1	3	1500	1,11	45	4	10	4.5	1	0	54	6	4	4	4
3	1	1.5	1	1,2	250	8,11	60	6	10	0.6	2	0	29	1	6	6	7
3	1	0.5	1	3	1500	1,2,10,11	90	3	15	7.5	2	1	45	2	5	5	8
3	1	4	1	3	350	5,11	90	6	10	0.7	2	0	61	6	2	6	3
3	1	4	1	2,3	75	1,5	90	4	15	4.5	2	0	21	7	5	4	2
3	1	3	1	2,9	50	5,11	90	2	25	7.5	2	0	16	7	2	5	1
3	1	2.5	1	2,9	150	1,2,5	60	4	10	5	2	1	18	7	3	7	2
3	1	1.5	1	2	1000	1,5,11	75	3	10	4.5	2	1	41	2	5	4	6
3	1	5	1	2	75	8,11	60	1	30	12	2	1	34	1	5	2	5
3	1	5	1	2	100	5,11	45	3	20	10	2	0	35	1	6	5	7
3	1	2	1	2,3	500	2,11	60	4	15	4	2	0	50	1	4	6	5
3	1	1	1	2,3	750	1,7,11	60	4	10	3.5	2	0	38	2	5	6	6
3	1	6	0	1	2000	2,8	30	4	15	8	2	1	55	2	2	4	5
3	1	0.25	1	2,3	2500	1,2,10	105	3	25	12	2	1	52	2	4	5	7
3	1	2	1	2	100	2,11	45	4	10	2.5	2	0	50	1	5	2	6
3	1	1.5	1	2	150	3,8,11	37.5	6	10	0.7	2	0	42	1	5	3	6
3	1	3.5	1	2	50	1,5	90	2	20	6.5	2	1	16	7	2	5	1

APPENDIX F: TRAFFIC DATA

Table F.1 Average vehicle movement[28] on weekday and weekend, NAK

GATE NO.	WEEKDAY							WEEKEND						
	BICYCLE	MOTORCYCLE	CAR	PUBLIC TRANSPORT	TAXI	SERVICE VEHICLE	VEH_WD_SUM	BICYCLE	MOTORCYCLE	CAR	PUBLIC TRANSPORT	TAXI	SERVICE VEHICLE	VEH_WE_SUM
1	18	594	396	0	30	66	1104	12	540	354	0	42	90	1038
2	6	642	384	0	6	108	1146	0	558	360	0	12	66	996
3	18	720	360	0	72	30	1200	6	468	300	0	12	96	882
4	0	162	60	0	12	12	246	0	132	60	0	24	12	228
5	12	864	432	0	54	108	1470	12	468	234	0	42	66	822
6	30	342	132	0	12	54	570	18	294	138	0	24	36	510
7	36	360	96	0	36	72	600	18	276	108	0	36	72	510
8	24	342	264	0	36	60	726	24	366	240	0	12	36	678
9	0	198	42	0	12	42	294	12	138	42	0	6	6	204
10	0	72	6	0	0	0	78	6	36	12	0	0	0	54
11	24	1104	384	0	42	168	1722	24	852	390	0	48	90	1404
12	18	1182	480	0	60	114	1854	6	996	384	0	36	120	1542
13	0	84	24	0	0	0	108	6	102	24	0	0	12	144
15	0	1044	720	0	42	102	1908	24	696	504	6	48	108	1386
16	0	258	204	0	18	30	510	12	354	84	0	6	12	468
17	12	126	42	0	6	12	198	6	54	54	0	0	18	132
18	6	252	90	0	0	30	378	0	342	78	0	12	24	456
19	6	318	120	0	6	36	486	0	144	120	0	0	24	288
20	6	1002	468	6	12	216	1710	12	858	438	6	18	102	1434
21	12	1050	636	0	60	168	1926	6	924	624	0	60	72	1686
22	0	54	0	0	0	6	60	18	60	0	0	0	12	90
23	12	300	156	0	12	72	552	12	240	192	0	12	48	504
24	42	480	12	0	54	42	630	6	510	6	0	36	24	582
25	0	480	6	0	12	54	552	6	468	12	0	18	30	534
26	0	30	0	0	0	12	42	0	84	0	0	0	36	120
27	24	966	768	0	84	138	1980	6	618	540	0	60	90	1314
28	24	1032	750	12	66	120	2004	12	756	528	12	66	72	1446
29	12	186	66	0	12	0	276	12	162	66	6	18	6	270
30	6	336	204	6	48	42	642	18	342	180	0	30	36	606
31	24	462	924	18	36	210	1674	6	390	882	0	66	150	1494
32	12	372	732	12	48	294	1470	0	186	774	0	78	72	1110
33	6	270	414	18	30	144	882	12	132	558	6	48	102	858
34	0	246	324	0	24	48	642	0	90	480	6	18	72	666
35	6	348	294	0	12	54	714	0	288	204	18	18	12	540
36	0	384	420	0	0	12	816	6	228	192	0	6	42	474
42	0	426	408	6	36	114	990	0	270	516	18	48	132	984
43	0	0	12	0	0	6	18	0	12	0	0	6	0	18

[28] Calculated from traffic data of i) morning rush-hour at 7:00-8:00, ii) mid-morning period at 10:00-11:00, iii) lunch-time peak at 12:00-13:00, iv) mid-afternoon period at 14:00-15:00, and v) evening rush-hour at 17:00-18:00)

44	12	60	48	0	0	24	144	0	72	90	0	0	6	168
45	0	78	36	0	0	6	120	0	96	60	0	0	0	156
46	6	390	372	6	42	120	936	0	300	480	12	60	132	984
51	18	408	516	30	24	246	1242	12	306	420	42	36	150	966
52	0	114	72	30	24	84	324	0	66	30	24	60	12	192
57	6	36	42	12	6	6	108	6	6	18	6	0	0	36
58	6	366	432	42	30	162	1038	18	240	348	24	42	144	816

Table F.2 Average pedestrian movement on weekday and weekend, NAK

GATE NO.	WEEKDAY					WEEKEND				
	CHILDREN/STUDENT	ADULT	ELDERLY	MERCHANT	PED_WD_SUM	CHILDREN/STUDENT	ADULT	ELDERLY	MERCHANT	PED_WE_SUM
1	18	24	0	6	48	6	42	0	0	48
2	12	36	0	6	54	0	12	0	0	12
3	6	24	6	6	42	12	48	0	0	60
4	0	42	18	0	60	18	24	18	0	60
5	12	66	6	0	84	6	36	0	0	42
6	0	30	0	6	36	0	36	0	0	36
7	6	30	6	6	48	6	48	0	6	60
8	24	54	6	0	84	36	78	0	12	126
9	36	96	6	6	144	24	48	0	0	72
10	0	66	0	0	66	18	6	0	0	24
11	0	12	6	0	18	0	24	0	0	24
12	60	6	12	0	78	0	6	0	0	6
13	0	36	0	0	36	6	0	24	0	30
15	18	162	24	0	204	6	66	6	0	78
16	12	126	18	0	156	24	30	6	0	60
17	0	0	0	0	0	12	18	0	0	30
18	0	36	0	0	36	0	66	6	0	72
19	6	102	6	6	120	0	12	12	6	30
20	42	186	0	0	228	18	114	18	0	150
21	18	204	12	0	234	24	120	0	6	150
22	24	198	12	24	258	12	180	12	0	204
23	30	72	0	0	102	24	72	0	0	96
24	36	366	24	42	468	48	390	18	42	498
25	36	204	12	24	276	66	234	18	18	336
26	30	96	0	54	180	18	90	6	54	168
27	24	168	0	6	198	6	84	12	6	108
28	30	66	6	0	102	12	42	6	6	66
29	12	12	0	0	24	0	18	0	0	18

30	0	138	0	0	138	6	72	0	0	78
31	30	60	0	0	90	0	30	0	0	30
32	0	18	0	0	18	0	0	0	0	0
33	6	18	0	0	24	0	18	0	0	18
34	0	12	0	0	12	0	24	0	0	24
35	0	90	0	0	90	6	12	0	0	18
36	0	36	0	0	36	0	18	0	0	18
42	0	6	0	0	6	12	0	0	0	12
43	0	0	0	0	0	0	0	0	0	0
44	18	36	0	0	54	0	18	0	0	18
45	0	36	0	0	36	0	12	0	0	12
46	0	18	0	0	18	6	18	0	0	24
51	12	6	0	0	18	0	18	0	0	18
52	36	24	0	0	60	0	0	0	0	0
57	12	42	12	0	66	0	18	0	0	18
58	30	24	0	0	54	12	36	0	0	48

Table F.3 Average vehicle movement on weekday and weekend, ANG

GATE NO.	WEEKDAY						WEEKEND					
	BICYCLE	MOTORCYCLE	CAR	PUBLIC TRANSPORT	TAXI	SERVICE VEHICLE	BICYCLE	MOTORCYCLE	CAR	PUBLIC TRANSPORT	TAXI	SERVICE VEHICLE
1	12	168	30	0	6	18	18	78	6	0	0	30
2	30	204	6	6	6	6	12	156	30	0	0	6
3	18	120	36	6	18	18	18	240	48	0	30	12
4	0	402	102	0	18	30	6	396	132	0	18	24
5	36	744	204	0	6	60	30	492	198	0	6	30
6	18	312	72	0	6	36	36	156	60	0	6	42
7	24	78	48	0	0	54	6	42	12	0	0	24
8	0	90	18	0	6	36	0	114	0	0	0	36
9	36	630	252	0	18	114	30	552	168	0	48	36
10	6	294	144	0	12	36	6	186	150	0	24	36
11	24	132	24	0	6	66	36	144	6	0	12	84
12	36	138	24	0	24	54	24	174	42	0	0	18
13	12	102	12	0	12	48	6	180	6	0	6	30
14	24	66	0	0	6	12	24	48	0	0	0	60
15	12	18	0	6	0	6	24	30	0	0	0	12
16	6	138	0	0	0	12	12	108	0	0	0	18
17	48	294	0	0	12	48	24	312	0	0	6	42
18	24	366	0	0	18	30	36	324	0	0	12	48
19	42	534	234	6	24	102	36	606	210	0	36	132
20	6	582	234	0	24	168	30	450	150	0	42	144
21	0	18	0	0	0	0	0	0	0	0	0	0
22	0	402	546	6	60	348	6	468	546	18	30	228

23	36	216	0	0	12	36	6	228	0	0	0	36
24	0	426	582	6	66	198	18	318	378	12	60	168
25	6	468	450	6	60	222	0	516	480	18	42	216
26	12	24	0	0	0	12	0	36	6	0	0	6
27	36	138	30	0	6	42	0	138	24	0	0	18
28	24	186	78	0	0	84	18	204	174	12	48	126
29	0	552	576	18	72	174	24	414	324	24	12	126
30	0	504	426	6	42	234	12	498	528	36	60	210
31	114	552	348	54	90	156	6	552	492	6	36	228
32	96	552	396	30	114	240	12	522	492	18	12	228
33	0	294	162	30	30	120	0	156	198	6	18	126
34	0	30	36	0	0	0	0	12	0	0	0	6
35	0	78	60	42	24	60	12	66	72	36	6	30
36	12	198	78	0	12	204	12	282	48	0	6	168
37-38	12	426	546	12	36	222	24	588	462	12	12	258
39	12	138	24	0	6	102	18	108	6	0	0	72
40	24	564	522	12	36	270	0	462	486	6	36	360
41	12	144	96	0	12	222	6	204	78	0	12	174
42	30	444	534	6	18	198	6	444	480	0	66	174
43	6	192	114	0	18	198	48	132	96	0	18	138
44	12	108	120	0	0	186	12	108	36	0	12	108
45	30	216	120	0	12	174	24	198	72	0	24	162
46	18	42	48	0	0	156	0	72	66	0	0	144
47	6	198	78	0	0	186	0	150	90	0	18	156
48	0	240	114	0	18	126	0	180	108	6	24	144
49	6	654	846	12	66	282	6	708	720	48	102	336
50	12	330	522	60	102	180	18	294	396	18	54	186
51	0	6	6	18	0	6	0	48	72	18	12	36

Table F.4 Average pedestrian movement on weekday and weekend, ANG

GATE NO.	WEEKDAY				WEEKEND			
	CHILDREN/ STUDENT	ADULT	ELDERLY	MERCHANT	CHILDREN/ STUDENT	ADULT	ELDERLY	MERCHANT
1	0	0	0	0	0	6	0	0
2	6	6	0	0	6	18	6	0
3	0	18	0	0	12	12	0	0
4	6	0	0	0	6	0	0	0
5	0	48	6	6	12	54	0	6
6	0	18	0	0	18	18	0	6
7	54	66	0	54	12	84	0	12
8	12	72	6	42	6	36	0	24
9	30	54	0	0	24	90	12	6
10	24	144	12	0	36	66	0	0
11	60	96	6	42	48	222	6	42
12	12	84	6	24	6	48	12	0
13	24	78	0	60	18	96	6	24
14	108	924	24	84	162	744	270	54

15	132	750	18	30	84	750	150	54
16	90	210	12	60	54	234	42	72
17	78	276	60	48	54	258	60	84
18	54	198	72	12	30	192	18	6
19	24	186	36	12	30	168	6	6
20	18	174	12	0	30	126	18	18
21	6	96	6	0	36	54	6	30
22	60	150	6	0	36	126	12	0
23	12	264	12	0	84	372	30	36
24	12	120	0	0	36	90	0	0
25	18	48	0	0	0	18	0	0
26	30	48	0	0	6	54	12	0
27	0	42	0	0	24	60	6	6
28	0	30	6	0	12	48	0	0
29	12	72	0	0	24	72	0	0
30	6	18	0	0	6	60	0	0
31	36	144	6	0	42	114	6	0
32	0	18	6	0	6	42	6	0
33	12	54	6	0	36	66	6	6
34	6	66	0	24	12	90	0	48
35	6	42	0	18	6	48	0	12
36	6	60	0	6	12	84	0	0
37-38	6	42	0	6	18	78	6	6
39	6	48	0	36	6	30	0	6
40	12	42	0	6	12	48	6	0
41	6	138	0	60	30	192	0	24
42	6	24	0	0	6	48	0	18
43	30	72	6	12	24	96	0	30
44	18	66	0	36	0	72	0	54
45	30	90	6	24	12	126	12	66
46	6	60	0	24	24	60	0	54
47	12	72	0	18	24	84	0	60
48	0	36	0	0	18	30	0	0
49	0	66	0	0	48	72	0	18
50	36	90	18	18	18	72	12	6
51	6	6	0	0	12	12	0	0

Table F.5 Average vehicle movement on weekday and weekend, CHA

GATE NO.	WEEKDAY							WEEKEND						
	BICYCLE	MOTORCYCLE	CAR	PUBLIC TRANSPOR	TAXI	SERVICE VEHICLE	TOTAL_WD	BICYCLE	MOTORCYCLE	CAR	PUBLIC TRANSPOR	TAXI	SERVICE VEHICLE	TOTAL_WE
1	12	666	468	138	66	54	1404	18	690	408	72	78	36	1302
2	6	366	246	0	48	66	732	6	180	126	0	36	72	420
3	12	402	312	90	54	12	882	0	570	336	48	60	6	1020
4	18	174	108	0	30	36	366	0	162	72	0	6	42	282

5	12	126	54	0	6	48	246	0	42	18	0	0	54	114
6	24	600	354	60	42	30	1110	6	444	258	66	78	12	864
7	0	204	138	0	12	24	378	0	138	60	0	12	24	234
8	0	606	444	78	72	18	1218	6	534	498	66	84	18	1206
9	18	504	300	0	36	18	876	12	258	210	6	30	36	552
10	6	486	438	0	90	42	1062	18	342	210	0	12	30	612
11	0	450	480	90	66	36	1122	0	378	282	60	54	24	798
12	0	516	474	72	102	36	1200	12	414	216	18	78	36	774
13	12	558	390	48	60	60	1128	0	390	282	54	84	36	846
14	78	336	348	108	90	84	1044	18	372	528	36	30	72	1056
15	12	264	162	0	18	60	516	12	96	6	0	30	24	168
16	42	294	144	54	78	60	672	30	84	42	0	42	42	240
17	36	210	126	36	78	54	540	6	198	72	6	30	36	348
18	6	378	378	138	90	102	1092	0	318	522	54	48	66	1008
19	0	78	0	0	18	24	120	24	162	18	0	6	30	240
20	12	264	42	0	42	42	402	24	252	12	0	0	42	330
21	12	318	42	6	24	66	468	0	336	84	6	24	48	498
22	6	120	0	0	24	48	198	6	108	6	0	24	18	162
23	12	366	342	36	114	120	990	66	276	132	6	72	60	612
24	0	348	420	96	66	78	1008	12	168	108	6	30	30	354
25	24	204	150	18	24	42	462	24	150	114	6	36	36	366
26	18	216	18	0	30	42	324	0	138	18	0	30	42	228
27	12	138	36	0	24	30	240	12	66	18	0	18	24	138
28	12	60	36	0	24	18	150	12	84	42	0	12	24	174
29	12	354	474	54	36	72	1002	12	336	540	36	54	72	1050
30	0	270	246	6	78	102	702	18	246	264	6	36	90	660
31	6	402	396	12	102	66	984	6	354	318	0	114	138	930
32	0	324	258	6	66	66	720	0	264	186	6	18	60	534
33	18	384	468	72	162	90	1194	6	372	474	60	90	126	1128
34	6	438	36	0	30	42	552	12	378	78	0	36	48	552
35	12	594	504	66	132	102	1410	6	408	462	36	72	96	1080
36	18	426	600	114	132	90	1380	12	378	438	42	96	36	1002
37	30	216	144	30	66	66	552	0	210	312	24	78	42	666
38	36	480	636	144	84	144	1524	0	336	378	60	12	66	852
39	48	180	228	24	66	30	576	24	108	138	24	12	24	330
40	42	288	552	144	186	102	1314	6	474	498	12	60	78	1128
41	12	84	72	0	6	12	186	6	72	96	6	6	12	198
42	0	186	30	0	36	12	264	0	162	54	0	30	18	264
43	12	330	0	0	36	36	414	12	276	0	0	36	24	348
44	12	408	432	30	132	90	1104	54	186	318	42	78	60	738
45	24	336	666	264	78	150	1518	18	396	732	312	102	132	1692
46	0	360	432	156	144	54	1146	24	354	324	234	84	66	1086
47	6	618	1290	210	114	84	2322	6	558	1212	186	168	138	2268
49	0	12	24	18	0	0	54	0	12	54	18	18	6	108
50	6	144	192	54	60	12	468	0	84	132	0	18	0	234

51	0	534	432	6	84	18	1074	6	498	390	12	90	54	1050
52	18	732	546	12	144	30	1482	6	666	318	6	138	66	1200
53	6	198	204	42	24	24	498	6	132	198	12	60	18	426
54	36	378	450	36	180	72	1152	24	396	456	66	60	60	1062
55	12	162	48	0	6	6	234	0	192	66	0	0	0	258
56	0	798	1260	150	198	132	2538	6	600	1518	138	168	186	2616
57	24	810	1308	150	162	192	2646	6	588	1596	150	198	198	2736
58	30	582	1452	180	126	180	2550	0	786	1560	168	216	186	2916
59	6	594	1236	186	198	150	2370	6	672	1638	108	156	210	2790
60	0	654	1422	114	192	162	2544	6	528	1428	240	102	162	2466
61	6	468	618	60	84	96	1332	0	354	300	0	108	36	798
62	0	606	1242	120	162	174	2304	0	714	1488	156	120	228	2706
64	6	900	1674	240	372	336	3528	6	708	1752	198	366	378	3408
65	0	42	12	0	12	6	72	0	24	18	12	18	6	78
66	0	0	12	0	30	0	42	0	18	42	0	36	6	102
67	0	978	1848	210	300	408	3744	0	822	2040	198	216	306	3582
68	0	126	42	18	30	24	240	0	66	48	36	18	18	186
70	6	438	960	288	144	108	1944	0	246	918	276	138	120	1698
71	0	12	24	12	12	6	66	0	12	36	0	6	12	66
72	0	24	18	24	0	6	72	0	42	18	6	0	0	66
73	6	252	222	384	102	42	1008	0	132	228	378	144	12	894
74	0	210	312	0	18	36	576	0	224	284	0	0	12	520
76	0	0	0	0	0	0	0	0	0	0	0	0	0	0
77	0	198	296	0	24	30	548	0	224	272	0	0	24	520
78	6	474	588	48	102	126	1344	6	402	714	48	90	96	1356
79	0	582	660	12	102	102	1458	6	618	654	30	72	132	1512
80	0	678	378	0	78	72	1206	0	486	330	6	42	114	978
81	0	0	12	0	0	6	18	0	126	126	0	18	24	294
82	6	360	300	6	90	60	822	6	360	168	0	84	36	654
83	0	210	246	6	18	18	498	0	134	248	0	24	0	406
84	12	912	756	36	156	120	1992	6	654	714	36	126	36	1572
85	0	188	222	0	30	12	452	0	182	248	0	18	12	460
86	0	696	750	6	96	102	1650	12	570	678	42	114	120	1536
87	6	42	66	0	12	48	174	0	126	18	0	6	24	174

Table F.6 Average pedestrian movement on weekday and weekend, CHA

GATE NO.	WEEKDAY				WEEKEND			
	CHILDREN	ADULT	ELDERLY	TOTAL	CHILDREN	ADULT	ELDERLY	TOTAL
1	24	84	6	114	6	48	12	66
2	12	132	0	144	12	132	0	144
3	18	72	6	96	0	42	54	96
4	0	78	0	78	36	54	12	102
5	24	138	0	162	0	96	6	102
6	72	90	0	162	36	42	0	78
7	30	42	0	72	0	12	0	12
8	24	96	6	126	42	48	18	108
9	6	84	0	90	18	42	0	60
10	54	102	0	156	24	48	0	72
11	18	96	0	114	18	96	0	114
12	24	90	0	114	6	60	0	66
13	6	168	6	180	12	126	6	144
14	150	624	156	930	90	438	150	678
15	30	234	0	264	36	312	6	354
16	192	744	162	1098	276	798	150	1224
17	102	708	168	978	108	828	366	1302
18	174	786	138	1098	204	732	234	1170
19	18	132	18	168	12	204	18	234
20	6	84	0	90	0	54	18	72
21	12	96	42	150	24	72	18	114
22	30	174	30	234	12	168	12	192
23	126	654	168	948	126	534	84	744
24	120	612	156	888	36	600	150	786
25	18	186	12	216	6	138	24	168
26	18	60	6	84	54	114	12	180
27	6	36	6	48	0	18	12	30
28	12	48	18	78	24	30	6	60
29	48	180	12	240	24	126	6	156
30	0	48	6	54	12	72	6	90
31	6	24	0	30	12	30	0	42
32	24	114	24	162	0	126	6	132
33	12	126	6	144	0	84	30	114
34	36	216	36	288	6	204	6	216
35	42	180	30	252	24	222	18	264
36	174	600	144	918	96	414	96	606
37	120	480	198	798	36	336	102	474
38	156	492	78	726	36	198	30	264
39	180	528	156	864	48	216	174	438
40	144	816	174	1134	48	438	210	696
41	24	66	0	90	0	48	0	48
42	48	252	24	324	30	228	12	270
43	36	162	18	216	30	186	6	222
44	216	588	234	1038	168	282	96	546
45	378	636	168	1182	198	366	114	678
46	186	510	114	810	174	318	66	558
47	0	6	0	6	12	24	0	36
49	54	48	0	102	0	66	0	66

50	6	36	0	42	0	72	0	72
51	0	12	0	12	0	36	0	36
52	12	12	0	24	0	24	0	24
53	24	114	0	138	0	66	0	66
54	288	612	156	1056	180	522	96	798
55	96	192	12	300	54	150	6	210
56	108	12	0	120	24	66	0	90
57	18	24	6	48	12	36	0	48
58	30	12	6	48	12	18	6	36
59	42	30	0	72	0	78	0	78
60	0	12	0	12	0	24	0	24
61	0	30	0	30	0	48	0	48
62	0	0	0	0	0	66	0	66
64	12	36	12	60	0	78	6	84
65	6	6	0	12	0	18	0	18
66	0	0	0	0	0	120	18	138
67	12	90	0	102	18	66	0	84
68	18	30	0	48	6	12	0	18
70	0	30	0	30	0	12	0	12
71	0	36	0	36	6	24	0	30
72	0	24	0	24	0	12	0	12
73	36	60	0	96	24	90	0	114
74	60	72	0	132	30	150	0	180
76	12	108	0	120	54	132	12	198
77	24	54	0	78	18	96	0	114
78	0	18	6	24	12	24	0	36
79	24	24	0	48	12	0	0	12
80	0	12	0	12	0	0	0	0
81	0	36	0	36	24	48	0	72
82	0	6	6	12	0	12	0	12
83	0	48	0	48	0	84	0	84
84	6	66	0	72	0	30	0	30
85	0	33	0	33	0	66	0	66
86	30	66	6	102	12	60	0	72
87	6	168	6	180	18	312	0	330

APPENDIX G: INTERACTION IN THE MAIN PUBLIC SPACES OF RETAIL AREA

Figure G.1 Legend of interaction as recorded

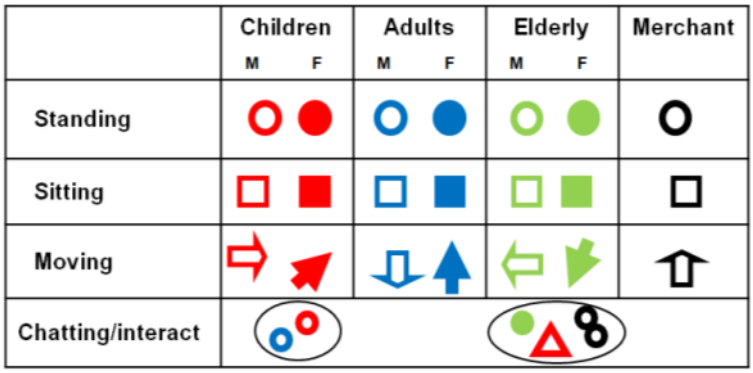
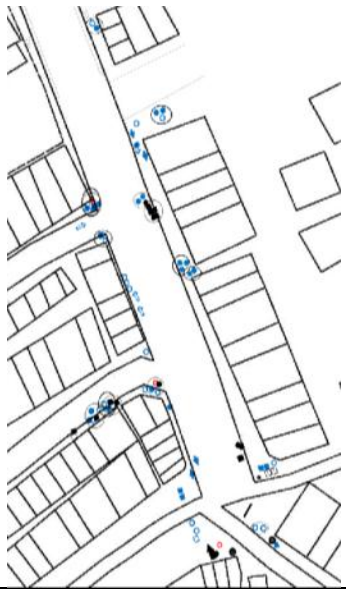
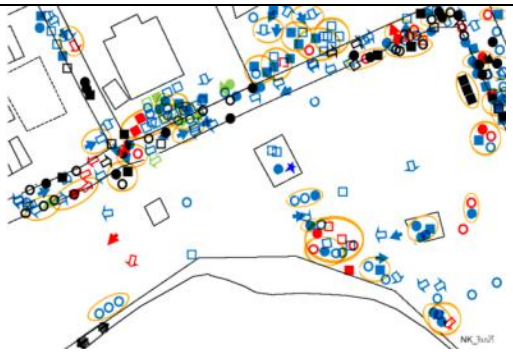
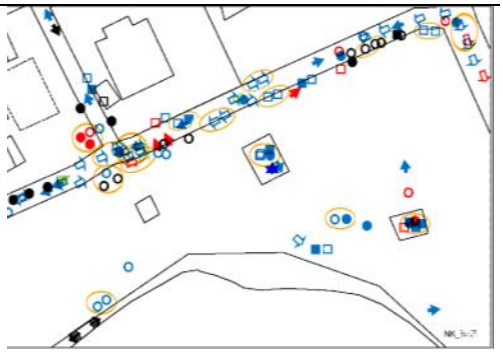


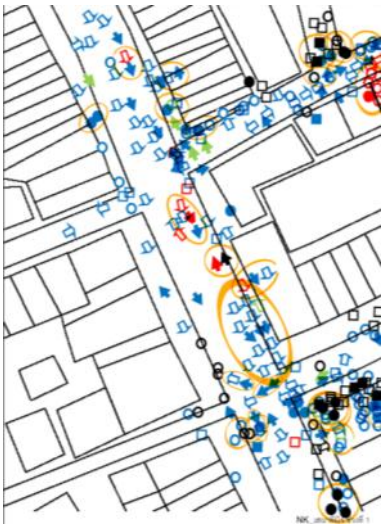
Figure G.2 Interaction in the main public spaces, Nakhon Nayok

AREA	WEEKDAY	WEEKEND
FIRST-PERIOD		
		

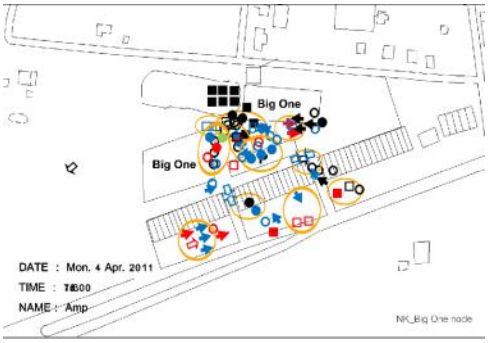
SECOND-PERIOD







TRANSITION AREAS



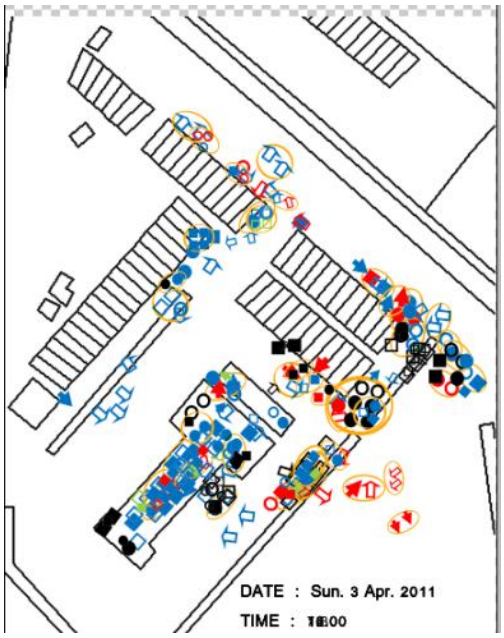
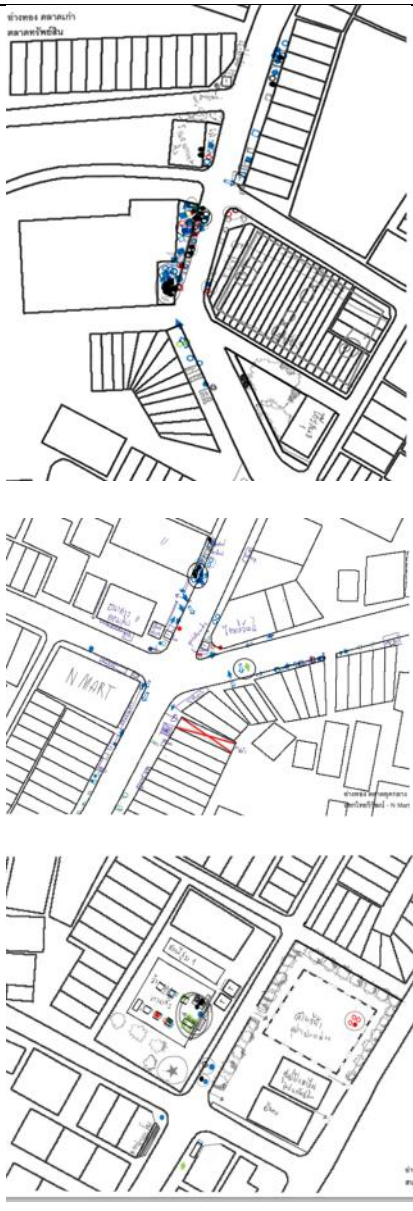
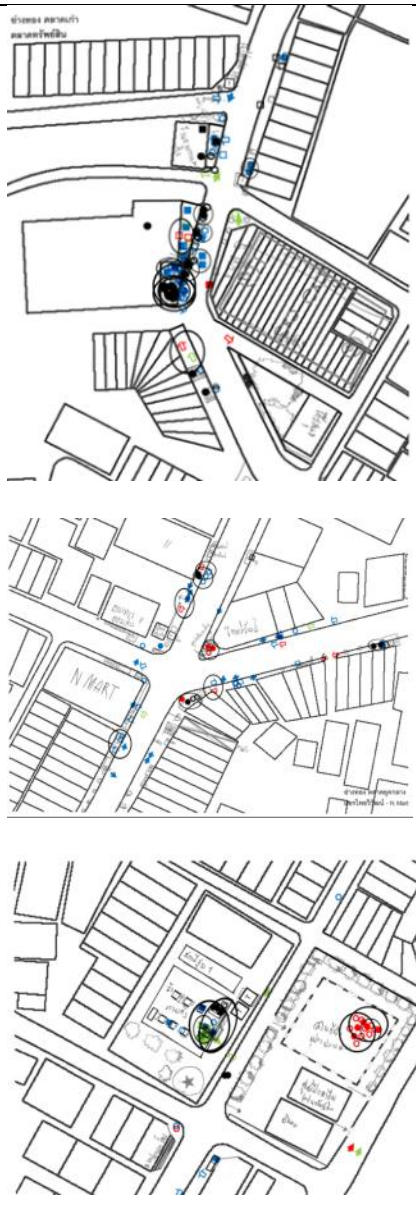
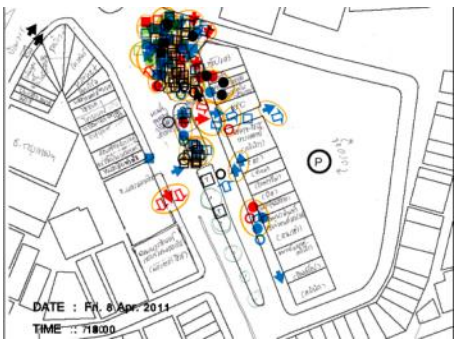
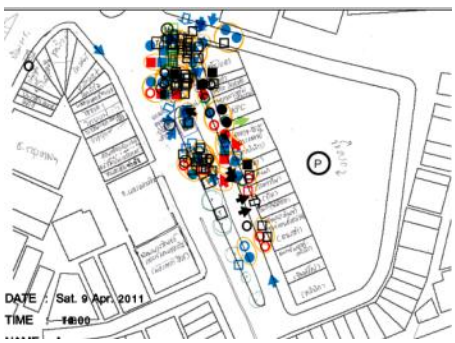
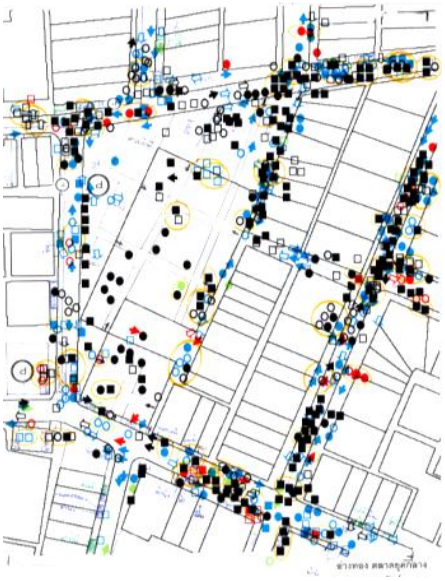


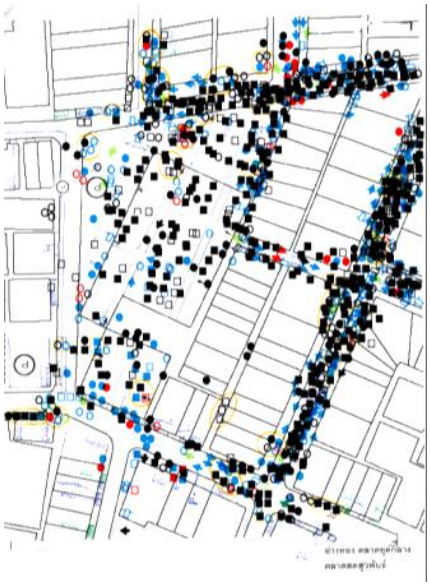
Figure G.3 Interaction in the main public spaces, Ang Thong

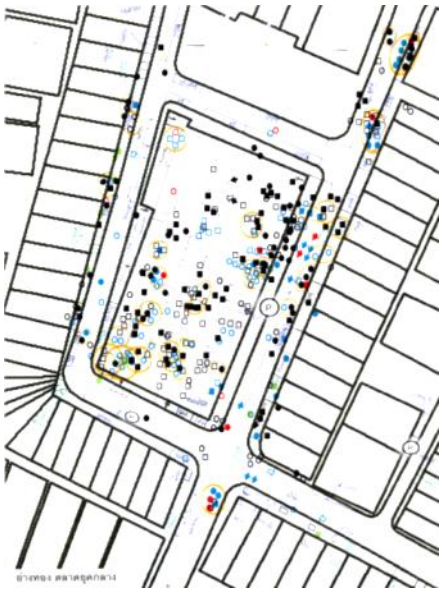
AREA	WEEKDAY	WEEKEND
FIRST-PERIOD		
SECOND-PERIOD		


DATE : Fri. 8 Apr. 2011
TIME : 18:00


DATE : Sat. 9 Apr. 2011
TIME : 18:00







EXPANSION AREA

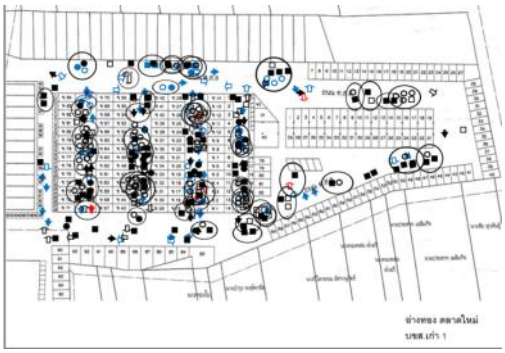
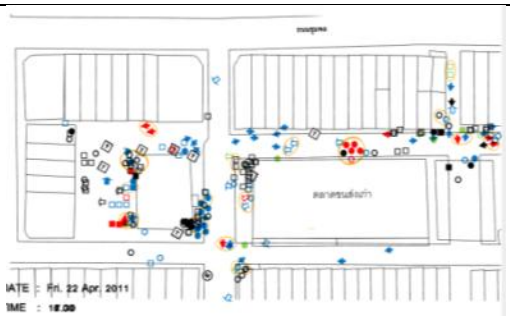
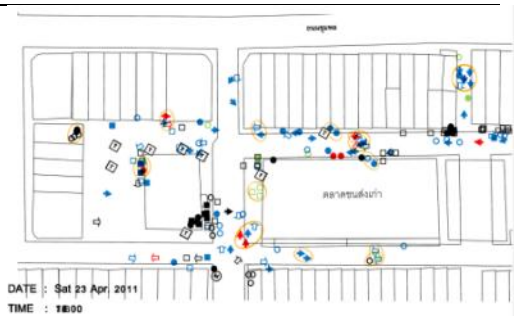
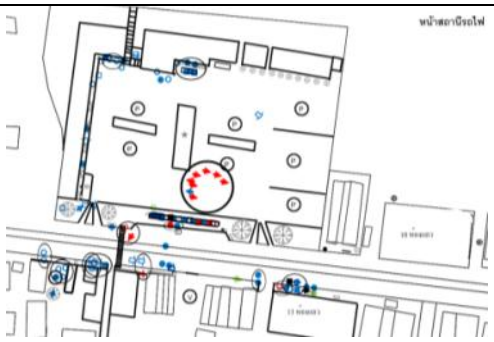
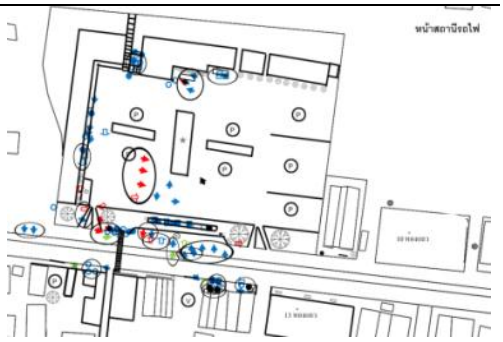


Figure G.4 Interaction in the main public spaces, Chachoengsao

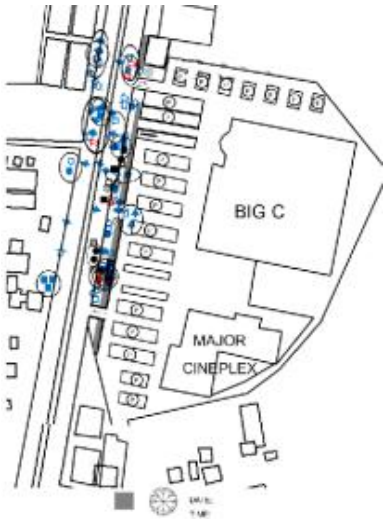
AREA	WEEKDAY	WEEKEND
FIRST-PERIOD		
		
		
SECOND-PERIOD		

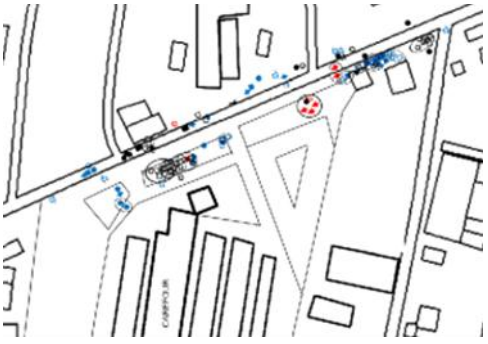
TRANSITION AREA

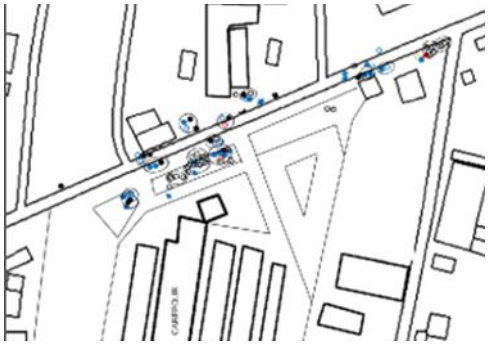




MODERN RETAIL AREA





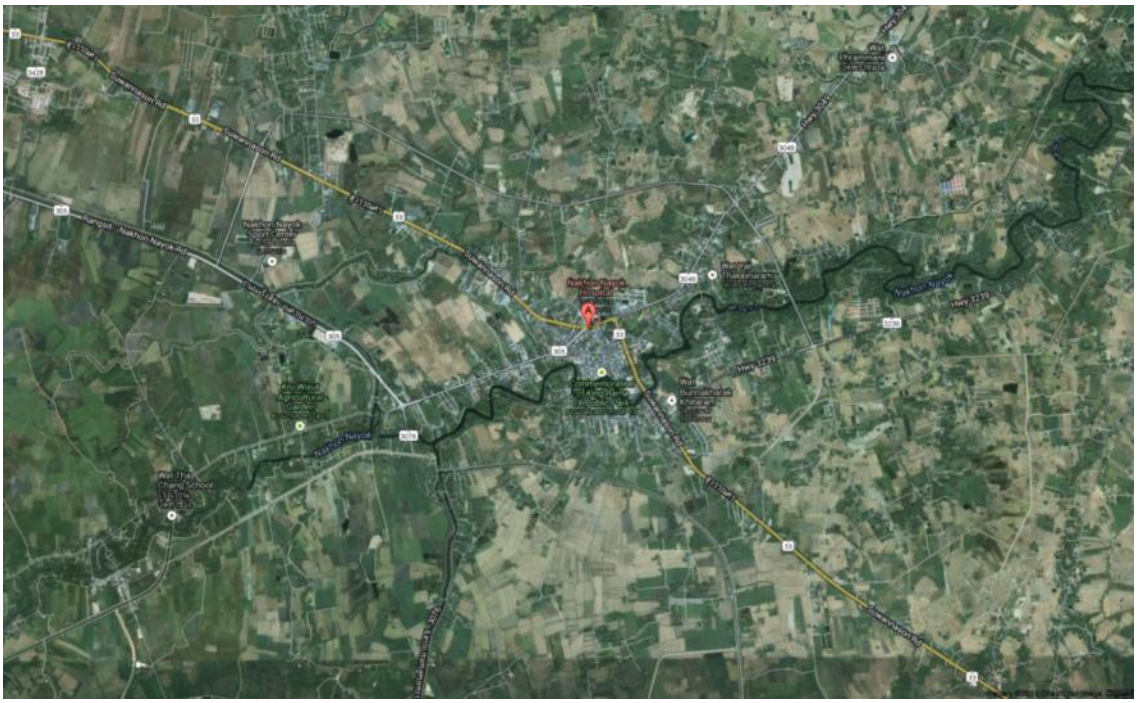


APPENDIX H: AERIAL PHOTOGRAPHS

Figure H.1 Aerial photographs: Nakhon Nayok

1973

1997

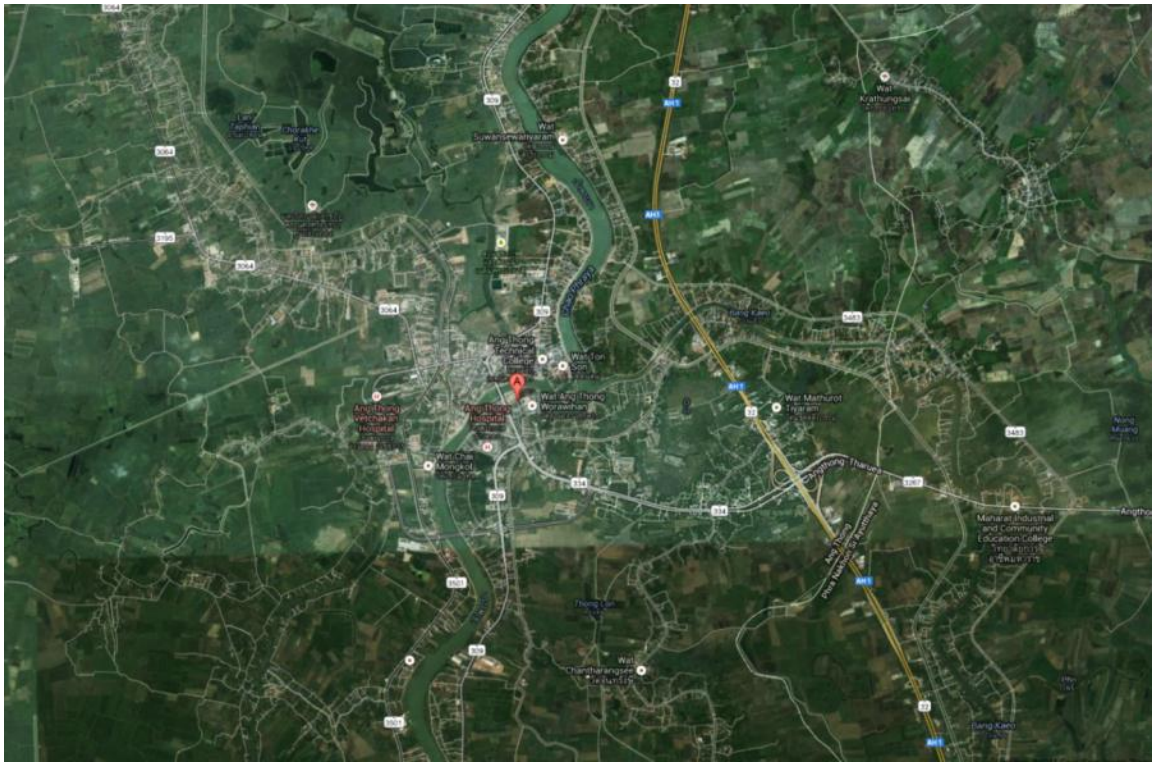


2011

Figure H.2 Aerial photographs: Ang Thong

1973

1993

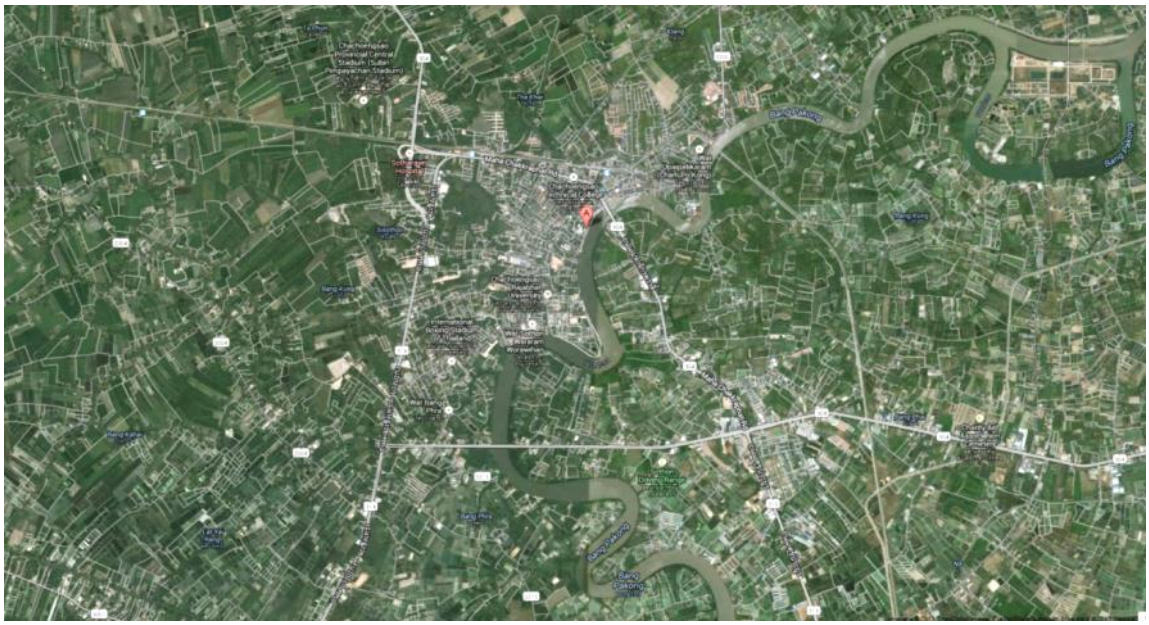


2011

Figure H.3 Aerial photographs: Chachoengsao

1973

1990



2011

APPENDIX I: BUILDING FAÇADE

Figure I.1 The first-period retail area of Nakhon Nayok

Figure I.2 The second-period retail area of Nakhon Nayok

Figure I.3 The transition area of Nakhon Nayok

Figure I.4 The first-period retail area of Ang Thong

Figure I.5 The second-period retail area of Ang Thong

Figure I.6 The third-period retail area of Ang Thong

Figure I.7 The first-period retail area of Chachoengsao

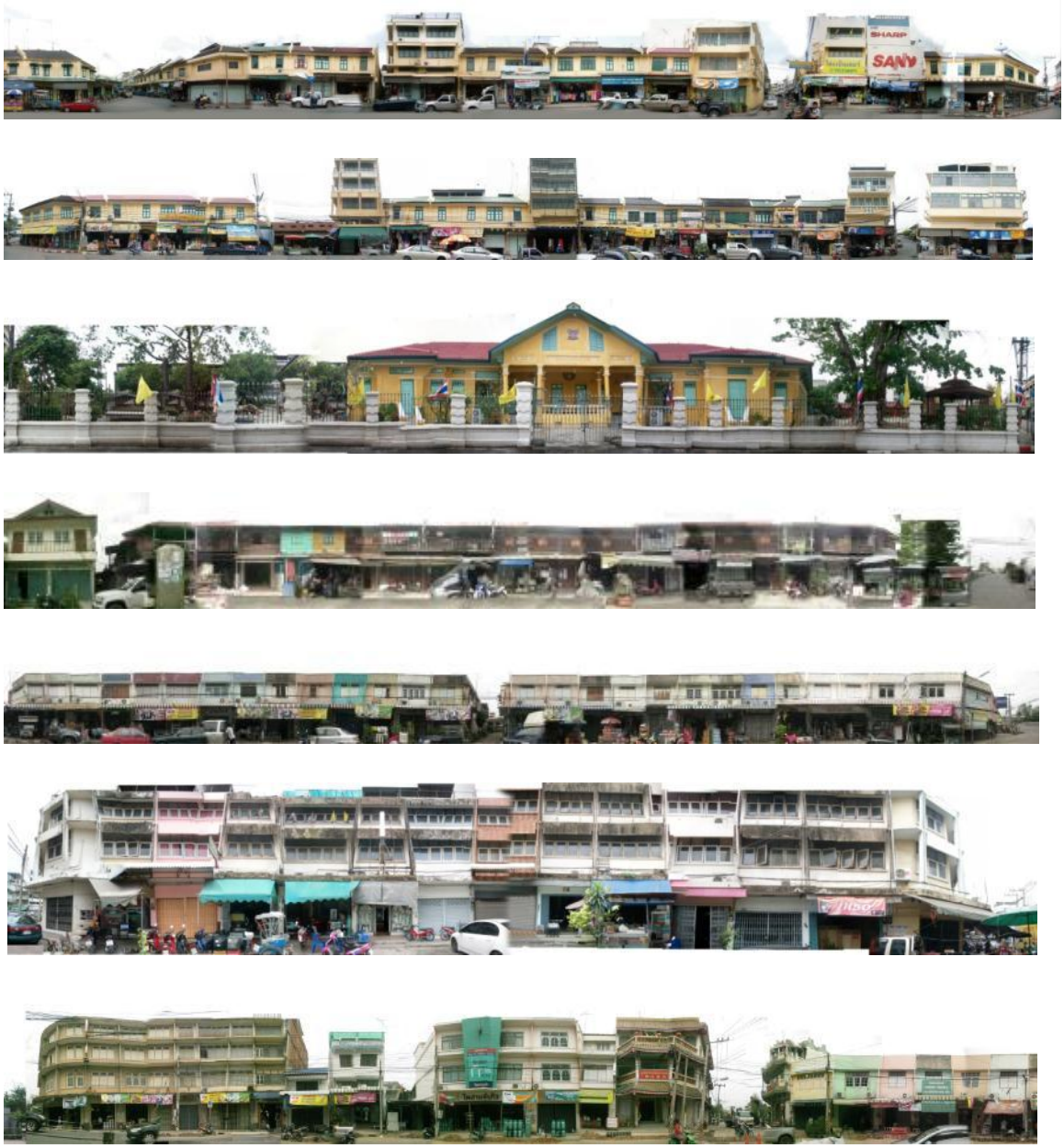


Figure I.8 The second-period retail area of Chachoengsao

Figure I.9 The third-period retail area of Chachoengsao


Dulux

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